



**AGRICULTURAL RESEARCH INSTITUTE**  
**PUSA**







# **SANITATION SUPPLEMENTS**

OF THE

## **TROPICAL DISEASES BULLETIN**

### **APPLIED HYGIENE IN THE TROPICS.**

By Lt.-Colonel W. WESLEY CLEMESHA,  
C.I.E., I.M.S. (retired).

ISSUED UNDER THE DIRECTION  
OF THE HONORARY MANAGING  
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**1924.**

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TROPICAL DISEASES BUREAU.

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SUPPLEMENT No. 1.]

1924.

[MARCH.

### DISEASE PREVENTION.

**BRAHMACHARI (B. B.). Flood Flushing and Malaria in the Kumarkhali Municipality.**—*Calcutta Med. Jl.* 1923. Aug. Vol. 18. No. 2. pp. 342-347. With 1 plan.

Kumarkhali is a small town situated on the River Gorai in the hyperendemic malarious area of Bengal. The population was 6,165 in 1891, 5,484 in 1901, 3,769 in 1911, showing a drop of over 60 per cent. in 20 years. The whole of the districts surrounding the town suffer in the same way. In 1918 out of 722 children 562 or 77·8 per cent., seen by the writer, had enlarged spleens. Various measures were taken to remedy these conditions, such as cinchonization or the popularization of quinine and its alkaloids, but did not give very good results because of the indolence of the people and also of expense.

Anti-larval measures would also have been extremely difficult and expensive, so what is known as "flood flushing" was attempted.

The author does not give a very clear description how this measure was carried out and although the reviewer has visited the town on several occasions he is not quite sure that the following description is complete.

Apparently a channel about 12 ft. wide and 6 ft. deep and 3,000 ft. long was cut from a point in the town towards the river. The earth from this channel was used to extend a road. When floods came down

during the monsoon season, water in the river rose and passed in large quantities into the town. This must have practically flooded the town leaving only the roads and the houses above flood level. Apparently endeavour was made to get the water to pass into all tanks, ponds, etc., within the municipal area.

As a result of this procedure there was a marked improvement in the malaria in the town as will be seen from the figures.

SPLEEN INDEX.				
	Under one year.	One year to under 5 years.	5 years to under 10 years.	Total.
1918 ... ..	60·6	80·7	80·1	77·8
1922 ... ..	8·5	9·3	15·1	11·5

Considering the spleen rate in the various wards in the town the writer says that where there was most "flood flushing" the improvement was greatest; in places where for engineering reasons this could not be satisfactorily arranged the improvement was less.

Spleen index decreasing in Ward 3 to 4·9 per cent. of the former rate.

Spleen index decreasing in Ward 5 5·0 per cent.

Spleen index decreasing in Ward 2 15·8 per cent.

Spleen index decreasing in Ward 1 28·8 per cent.

Spleen index decreasing in Ward 4 33·9 per cent.

The cost of the measures was 2,126 rupees.

These results are very striking, and for the benefit of those who are not in close touch with anti-malarial work in Bengal, a more detailed description of the process of flood flushing is desirable.

UNITED STATES PUBLIC HEALTH SERVICE. Treasury Department.  
Public Health Bulletin No. 115. 1921. Jan. 192 pp. With  
12 figs. [70 refs.]—**Transactions of the Second Annual Anti-  
malaria Conference of Sanitary Engineers and others engaged in  
Malaria Field Investigations and Mosquito Control. Held at  
Louisville, Ky. Nov. 16-17, 1920.**

This Bulletin, a report of nearly 200 pages, contains a series of papers on anti-malarial measures read by health officers, sanitary engineers and malaria experts, engaged in the Southern States of America and is of great interest. A verbatim account of the discussion is given which much increases its value. The names of the officers taking part are well known to all who have followed the literature on this subject. Dr. LE PRINCE acted as chairman. It is impossible to do justice to the many papers, which deal with every aspect of anti-malarial work. We propose only to make a few comments on one or two.

A paper by Mr. E. JOHNSON, Sanitary Engineer, deals with oiling and larvicides and contains some new suggestions. He commences by saying that a body of water should never be oiled unless there is evidence that mosquitoes are actually breeding in it. He is a great advocate of the use of sawdust obtained from soft wood, hard and green timbers being unsatisfactory. It should be soaked in a mixture of equal parts of kerosene and crude oil for at least 24 hours. The soaked sawdust should be light brown in colour and should not contain too much oil. When ready it should be powdery and should scatter rapidly

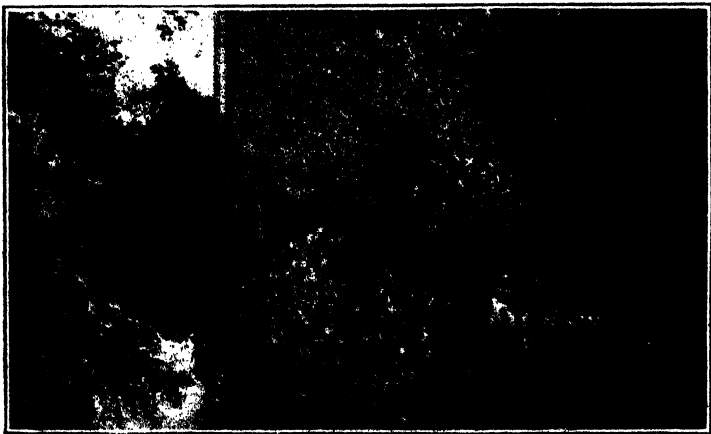


FIG. 1.—Before burning down weeds. Showing use of oil burners on maintenance work on a ditch initially cleared one-and-a-half months to two months before. The cost of maintenance work, using burner, was approximately five times as much as handwork.



FIG. 2.—Burning.

FIG. 3.—After burning. The cost of maintenance work, using burner, was approximately five times as much as handwork.

[Reproduced from *United States Public Health Bulletin*, No. 115.]



when thrown on to the water. The mixture is particularly satisfactory for use in oiling rapid running streams; for slow streams and for some kinds of ponds and pools lumps of waste soaked for 48 hours in oil are actually more satisfactory. These are pegged down in the mud at the bottom, and give off a fine film of oil for a considerable time. The method is particularly satisfactory for small seepage ditches. Both these methods are also much more economical than the ordinary hand spray. Crude creosote and "Kreso" Dip No. 1 have also been used with good results. This is apparently poison for the larvae of mosquitoes and when it is spread on the pool the larvae clinging to the bottom come to the surface and are killed. It is also useful in ascertaining if larvae are actually present in any particular piece of water. The writer considers that it is specially useful in pools that occur after heavy showers.

In the discussion Mr. PARKER recommends the use of an oil soaked mop as more convenient than the spray, particularly for such places as crab holes where mosquitoes frequently breed.

The paper on oil burners as weed killers by F. R. SHAW describes in detail the use of an ordinary fire generating apparatus which is very much on the lines of the ordinary blow lamp. Pictures show the results of its use (Figs. 1-3). Unfortunately the method is nearly 16 times as expensive as removal by hand labour, and the rate of the recovery of the vegetation is as rapid as if it had been cut down with a sickle.

In the discussion Mr. LENERT pointed out that it required four men to put out one fire as it was in considerable danger of spreading to a neighbouring timber yard.

A paper by J. G. FOSTER on subsoil drainage shows with diagrams (Fig. 4) how it is possible to increase the usefulness of what would

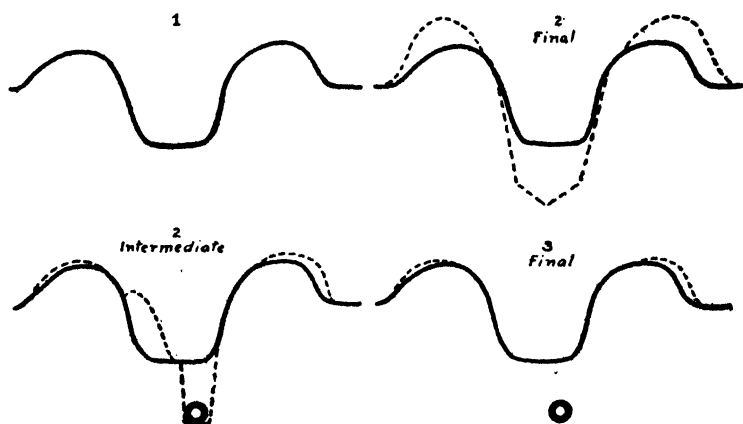


FIG. 4.—Showing elective methods for ditch improvement.

[Reproduced from the *United States Public Health Bulletin*, No. 115.]

be called the kutchra drain in the East, by putting pipes in below the earth invert. He suggests that second quality pipes of the spigot and bell design are fairly satisfactory, because there is no necessity to "make" the joints. Inequalities in the manufacture do not render them unsatisfactory. In the sand the joints may be packed with oakum or rags; for most ordinary light earth nothing is required.

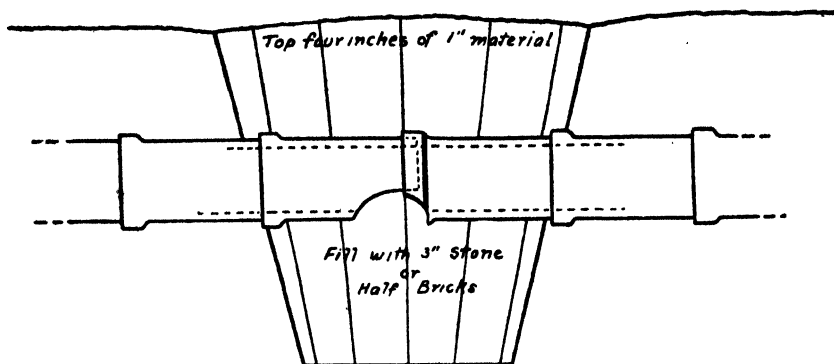


FIG. 5.—Rough filter for use in drainage operations. Protect bore of pipe from intrusion of filter material by wrapped mesh fabric, galvanized, or sloping set iron rods, or by junked domestic grate basket parts.

[Reproduced from the *United States Public Health Bulletin*, No. 115.]

He also gives a picture (Fig. 5) of a filter on a subsoil drain. The chamber is filled with 3-inch broken stone and brickbats; a hole is cut on the under side of the drain, as shown in plan. The surface is best covered with a fine grade material to prevent stones being removed.

**NATIONAL MALARIA COMMITTEE [U.S.A.]. Malaria and the Engineer.**

**A Treatise for Technical Students. Prepared by the Committee on Sanitary Engineering of the National Malaria Committee.** Published by St. Louis Southwestern Railway Lines. [St. Louis, Mo.] 1922. 20 pp. With 10 figs.

This is a short treatise on malaria suited to the needs of engineering students, drawn up by four gentlemen whose names are well known in the literature of malaria in America.

The work is as non-technical as possible. It deals with the life history of the mosquito and conditions that are necessary to produce malaria. Most particularly interesting, from the medical point of view, are sections 4 and 5, which deal with "ways in which engineering projects increase the prevalence of malaria" and "how the engineer can avoid creating malaria." Undrained borrow pits, defective drainage construction, suburban road ditches, etc., are discussed at considerable length. The four measures given as suitable for avoiding malaria are, drainage, drainage maintenance, fish control and the application of larvicides.

The following short extract and the pictures reproduced (Figs. 6-11) give a good idea of the scope of the work.

Summary of what to do and what not to do:—

"(a) In areas in the United States where malaria prevails, don't fail to consider standing or sluggish water as a menace to health and its removal or control probably of great importance.

"(b) Consider undrained borrow pits as a potential danger that should not be allowed.

"(c) Whenever possible, culverts must be so placed as to drain the bottom of all wet lands in the culverts drainage valley, and not to interfere with future small drainage projects on farm lands, etc.

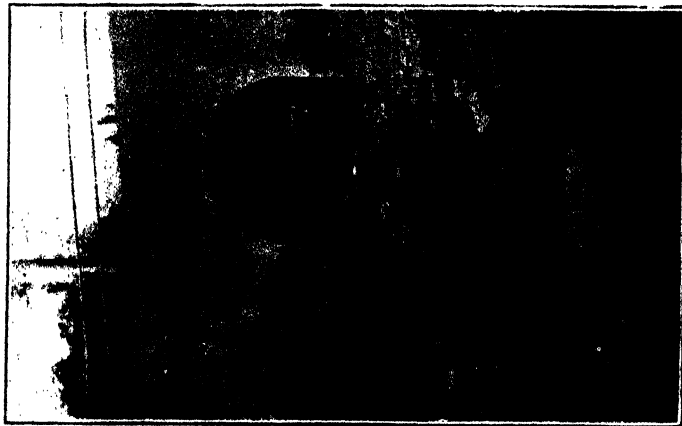


FIG. 6.—A typical city stream before ditching and clearing of vegetation.

[Reproduced from *Malaria and the Engineer*.



FIG. 7.—The same stream after ditching and clearing to prevent mosquito production.

*A Treatise for Technical Students. Prepared by the Committee on Sanitary Engineering of the National Malaria Committee.]*

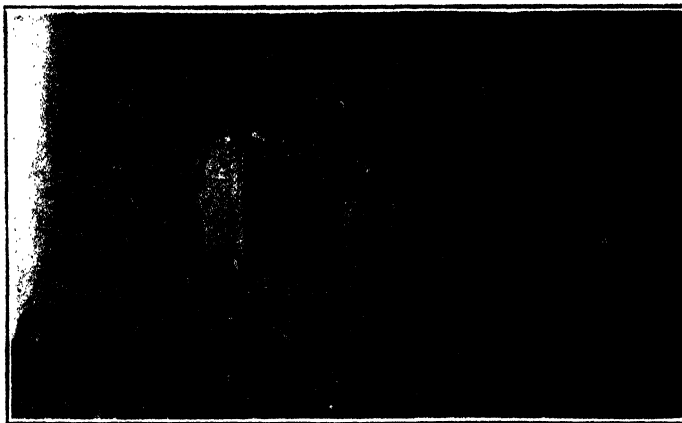


FIG. 8.—A road culvert placed at too high an elevation, to drain completely—a "man-made" mosquito producing area.

*Prepared by the Committee on Sanitary Engineering of the*



FIG. 9.—A typical "man-made" railroad borrow pit that produces many mosquitoes because it cannot be drained.



FIG. 10.—A typical ditch made with dynamite.

[Reproduced from *Malaria and the Engineer. A Treatise for Technical Students. Prepared by the Committee on Sanitary Engineering of the National Malaria Committee.*]

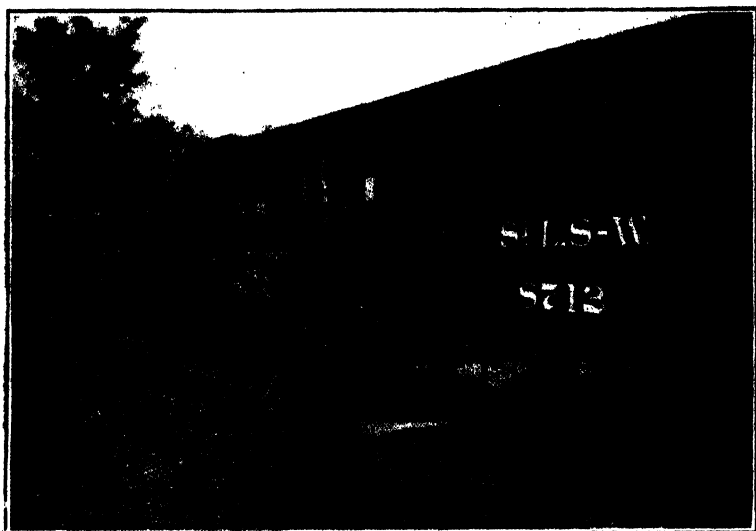


FIG. 11.—A typical railroad camp on wheels. Note that the windows and doors are screened to keep out mosquitoes.

[Reproduced from *Malaria and the Engineer. A Treatise for Technical Students. Prepared by the Committee on Sanitary Engineering of the National Malaria Committee.*]

“(d) Do not attempt to drain seepage outcrops with ‘crowfoot’ ditches when intercepting ditches are necessary. In making intercepting ditches, the excavated material should be placed on the down hill side of the ditch.

“(e) Do not allow contractors or others to dig wide bottom ditches along highways and railroads where narrow bottom ditches can be used, and see that those ditches are dug to proper grade so as to retain a minimum of stagnant water.

“(f) Do not fail to use your influence for the proper maintenance of roadway and railroad ditches, particularly near settlements, villages and towns.

“(g) Municipal engineers should advise town commissioners to have all roadside pools eliminated, to prevent water standing in roadside ditches in town suburbs, and make every effort to have this necessary work accomplished.

“(h) It will be found economical to line the bottom portion of Anopheles producing ditches in town suburbs with concrete, or use drainage pipe, in place of maintaining an open ditch.”

DI GIOVANNI (I.). [*La lotta antimalarica in una miniera di zolfo.*] [Anti-malarial Campaign in a Sulphur Mine.]—*La Miniera Italiana*. 1923. No. 2. [Summarized in *Ann. d'Igiene*. 1923. May. Vol. 33. No. 5. pp. 364-365.]

The atmosphere and water of sulphur mines are believed to be fatal to Anopheles, but the water at a depth of 200 metres is nearly neutral and abundant larvae of Culex and Anopheles were found in it.

In 1921 amongst 300 labourers on one sulphur mine 231 suffered

from malaria (77 per cent.) ; of these only 93 were relapse cases, the remainder being primary attacks. This prevalence was ascribed to the fact that the labourers used a large amount of water for which the drainage was inadequate. Screening was not practicable since the metal is corroded by the sulphurous acid gas. Better regulation of the water supply, drainage, quinine prophylaxis and intensive treatment of patients during winter and spring have yielded excellent results, and in 1922 there was only one case.\*

**CATALUNYA. El Paludismo en el Bajo Llobregat. Actuación de la Comisión Mixta ejecutiva para la Lucha Antipalúdica en el Bajo Llobregat desde diciembre de 1921 a noviembre de 1922.**—36 pp. With 1 graph. 1922. Barcelona.

A mixed Executive Commission appointed to deal with malaria in the Llobregat delta, Barcelona, finds that marshes produced by a barrier of sand, and rice fields, constitute an ideal intensive nursery for Anopheles. Drainage of the marshes into a central canal, oiling, quininization, insistence that over rice land the water shall always move at a rate faster than 10 metres a minute, are its main recommendations.†

**MADRAS. The Fifty-Ninth Annual Report of the Director of Public Health and the Thirty-Third Annual Report of the Sanitary Engineer Madras 1922.** [RUSSELL (A. J. H.), Director of Public Health and WESTERDALE (J. S.), Offg. San. Engineer to Gov.].—pp. 101+5. With 5 graphs and 1 map. 1923. Madras: Supt. Govt. Press. [Price 14 annas.]

An epidemic of relapsing fever occurred in the Tanjore and Trichinopoly districts. Its maximum was from January to March 1922 ; up to the end of January there had been 9,060 cases with 3,282 deaths, or 33·3 per cent. mortality. In some villages the death rate was as high as 66 per cent. In several other parts of the Madras Presidency similar outbreaks were reported. The Sanitary Commissioner reports that the infection has gradually spread into other Presidencies. Major CRAGG who has been investigating the outbreak in the north thinks that the climatic conditions of Madras are unfavourable, and that the fever will probably not appear in epidemic form in any one area for more than two years.

**UNITED STATES PUBLIC HEALTH SERVICE. Treasury Department. Public Health Bulletin No. 108. 1920. Oct. 6 pp.—Transactions of a Special Conference of State and Territorial Health Officers with the United States Public Health Service for the Consideration of the Plague Situation. August 3 and 4, 1920.**

At the meeting of City Health Officers held in 1920 at Galveston, Texas, some very interesting facts as regards the habits of rats in the southern states of U.S.A. were discussed.

"The Norway species (brown or grey rat) is essentially a burrowing animal, living chiefly under floors and in cellars. This species is more readily trapped than the others, and because of its burrowing habits, rat-proofing measures are most effective against this species. On the

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\* Summarized by Dr. H. Harold SCOTT.

† Summarized by Lt.- Col. Clayton LANE.

other hand, the *rattus* and *alexandrinus* do not burrow and in the United States live almost exclusively indoors, within loosely piled material, merchandise, hollow spaces and are most often found overhead. They are notoriously trap-shy, but snap traps placed on beams and in similar overhead runways will prove very effective. It naturally follows that rat catching and rat proofing are of less value against the *rattus* and *alexandrinus*, and experience has demonstrated that a building absolutely rat proof, as far as construction is concerned, will harbour, when filled with stored material, an immense number of these species. Fumigation (preferably by cyanide gas) is the effective measure to be employed against the *rattus* and *alexandrinus*."

Rats are very seldom found in goods trains in the U.S.A. This is attributed to the fact that *rattus* and *alexandrinus* are comparatively rare, as this variety constitutes the tourist element in the rodent population. The daylight loading of freight cars and the prohibiting of cars from standing open alongside of loading platforms during the night would seem to embrace all reasonable precautionary measures to prevent the spread of plague in overland carriers.

BOUFFARD (G.). *La chloropicrine dans la lutte contre la peste à Madagascar*.—*Bull. Soc. Path. Exot.* 1923. Oct. 10. Vol. 16. No. 8. pp. 602-605. [2 refs.]

The writer discusses the use of chloropicrin for ridding towns in Madagascar of rats and rat fleas, and after 18 months' experience, during which a thousand houses have been treated, comes to the conclusion that it is a very powerful agent for the destruction of both. It is also a sound disinfectant and is free from danger but causes a certain amount of nuisance to the staff who handle it.

A concentration of 5 grams per cubic metre appears to be the minimum to secure thorough action on fleas; rats are much more sensitive and for them 2 grams per cubic metre is sufficient.

Considerable difficulties are met with where the roofs are made of thatch; in the rat runs, however, it is extremely efficient.

The heaviness of the chloropicrin vapours adds to the effectiveness.

UNITED STATES NAVAL MEDICAL BULLETIN. 1923. Nov. Vol. 19. No. 5. [Notes and Comments.] p. 696.

"We learn from *Science* of December 15, 1922, that a new method of killing rats, now being tried out in Hawaii, consists in distributing poison cakes through the sugar-cane fields and non-cultivated areas. The poison used is barium carbonate. This is mixed with flour dough, which is then made into small round cakes and coated with paraffin to protect them from dampness and molding.

"A man on horseback dropping a rat cake every 10 feet can cover an area of 35 acres in a day, at a total cost of 16 cents per acre. This procedure repeated three times a year is reported as sufficient to control the rat pest on the islands."

HANCOCK (George C.) & WHITE (P. Bruce). *Report on an Outbreak of Dysentery in the Urban District of Lynton, Devon*.—*Ministry of Health. Reports on Public Health and Medical Subjects No. 20.* 17 pp. 1923. London: H.M. Stationery Office. [Price 4d. net.]

The epidemic was due to the fact that in one dairy farm out of ten the owner and the foreman were suffering from dysentery which they

had no doubt contracted during the war. The foreman was found to have a mixture of Shiga and Flexner Z types and the farmer Flexner. In all there were 18 cases in 11 households, 13 being in children and 5 in adults. Multiple cases occurred in five households.

The infected farm supplied 52 households in the town, 17·3 per cent. of which had at one time or another serious cases of dysentery. There were no less than 4 deaths; the cases were spread over a period of four months. No explosive onset, such as is found in water-borne disease, was recorded.

**LOPEZ RIZAL (L.). Typhoid Investigation. Epidemiological Report on Typhoid of 1922.**—*Monthly Bull. Philippine Health Service.* 1922. Oct.-Dec. Vol. 2. Nos. 10-12. pp. 303-356. With 4 maps and 2 charts.

In the year 1922 there occurred, in the town of Manila, a serious outbreak of enteric, which was very carefully investigated by the writer. He gives a long and valuable report of the work. His findings are of interest as well as his recommendations.

Summary of findings :—

" 1. The centre of incidence of the present typhoid fever epidemic does not coincide with the centre of population.

" 2. The incidence is very much higher (a) in the districts located on the north side of the Pasig River; (b) more among Japanese than among other nationalities; (c) among males; (d) in the groups of population from 11 to 20 and from 21 to 30 years of age; and (e) among the unvaccinated people.

" 3. The case fatality of the present epidemic is 27·75 per cent. among city cases, and the mortality is 1·53 for each 1,000 of population. The fatality and mortality figures keep, however, no relationship with the incidence. The fatality in cases kept and cared for at home is remarkably higher than the cases treated in hospitals. The fatality is, further, in inverse proportion to the duration of time elapsed from onset to the date the case is reported. The fatality of the present epidemic is remarkably lower than the fatality observed in the last six years, with the exception of that corresponding to 1918.

" 4. There is still a relatively large proportion of cases that are not reported except when already dead. No mortality among persons who have received the complete series of inoculations prescribed (two c.c. of the mixed typhoid and cholera vaccine or 2·5 c.c. of the T.A.B. vaccine).

" 5. Typhoid infection predominates over that of paratyphoid A and B with the interesting particular that among carriers, paratyphoid A infection is the more prevalent.

" 6. Late reporting of cases and ineffective isolation in houses are instrumental in the large percentage of contact and secondary infections.

" 7. Immediate contact infection is responsible for a good proportion of cases, but a larger one is probably due to contaminated water, milk, ice cream, and other food-stuffs on account of faulty handling.

" 8. The water supply and the sanitary sewer system are apparently not to be considered causes of the present epidemic.

" 9. The most important factor that influenced the present outbreak is assumed to be the large amount of uninspected 'ice-drop' and the kindred 'frozen sugar-water' consumed during and before the Carnival



season. No other factor can reasonably be admitted to explain, partially at least, such a quasi-massive infection a little before, during and after the Carnival Week.

" 10. Carriers' control is a factor that has not been given proper attention in the past. It is estimated that there are not less than four carriers to every 1,000 of population in the City of Manila. There are 4.71 convalescent carriers for each hundred cases; 1.18 carriers in every hundred contacts; 3.15 per cent. among water-carriers and 1.22 per cent. among food-handlers.

" 11. Isolation, as found by the Committee, is relatively better practised in hospitals than in private houses. In general, however, it is not so effective or practical as it should be.

" 12. Diagnostic methods are unsatisfactory and defective.

" 13. Vaccination against typhoid was found to be, to a certain extent, ineffective since a large majority of the reports gives a great percentage of people having been given a single injection only. Typhoid inoculation, on the other hand, either using the mixed cholera-typhoid or the T.A.B. preparation, *if the series is completed*, seems to afford a good protective measure and an effective means of controlling an epidemic.

" 14. Supervision of the prepared foods and water, food-stuffs, ice cream, ice-drops, etc., has been somewhat neglected and the enforcement of certain regulations relaxed.

General recommendations :—

" 1. General sanitation, as refers to waste disposal, garbage, and other refuse, its use as a filling material, flies campaign, drainage, etc., must be given more attention.

" 2. The water supply of the City of Manila must be improved by bettering the water treatment methods now employed.

" 3. Strict supervision of and enforcement of sanitary rules and ordinances in all factories and other public places used as centres of distribution of foods and food-stuffs. Similar supervision must be exerted over all food handlers.

" 4. The campaign for the search and discovery of typhoid and paratyphoid carriers must be continued as routine work. Incubation carriers, contact, convalescent, and chronic healthy carriers, especially among food-handlers, must be the subject of preferent attention.

" 5. The follow-up and control of carriers is a very important factor and should not be overlooked.

" 6. Prompt reporting of cases must be secured from all physicians and hospitals.

" 7. Diagnostic methods must still be improved. The Philippine Health Service must furnish all facilities for laboratory diagnosis.

" 8. Isolation and nursing methods in hospitals must be effective and carried out more or less in accordance with the regulations recommended by the Committee.

" 9. Incomplete individual vaccination should not be permitted."

HUBBARD (John C.). **Influenza Quarantine.**—*Proc. Med. Assoc. Isthmian Canal Zone.* 1920. Jan.-Dec. Vol. 13. Pts. 1 and 2. pp. 99-101.

The writer gives the results of his experience of the 1918 influenza epidemic. Attempts were made to protect the public in the following

ways : masks worn over the face, nasal sprays, throat gargles, disinfectants, serum and vaccine ; none was very successful, but it is only fair to state that conditions of travel were decidedly abnormal as a result of the war.

The writer's final opinion is :—

" We feel reasonably sure that if we can isolate the active cases and carriers we can prevent its spread, as was demonstrated on the Canal Zone in this year's epidemic . . . . .

" The regulations for the Canal Zone ports were, in part ; ' If there have been no cases during the voyage, and careful examination of passengers and crew reveals no sickness, a general quarantine is inadvisable. If cases have existed or are found on board, the following is advised :—'

" 1. Taking temperature of those apparently well.

" 2. Removal of the seriously sick to the hospital.

" 3. Removal of those recovering or slightly sick to quarantine station.

" 4. Officers and crews to remain on board at least 2 days after the removal of sick.

" 5. Detention for 2 days, preferably at quarantine, of passengers who have been in contact with the sick. Unless unusual precautions have been taken, this will include every one on an infected ship.

" 6. Those exposed and quarantined as per paragraph 5 should, when released, be instructed in writing to report daily for 3 days to the health officer or district physician nearest their destination, etc.

" These regulations proved to be a great help during 1918, and no doubt were largely responsible for the protection of the Zone from infection, but, in the writer's opinion, 2 days is insufficient time for observation, and there is no provision for a vessel that is only 2 to 4 days from an infected port and there is no method suggested for the disinfection of the carriers."

The article also refers to the measures against influenza used in Australia : 14 days' quarantine for all infected vessels, daily inspection of all contacts and removal of cases with a temperature of 99° to a quarantine station, the contacts being treated with nasal and throat douches of zinc sulphate.

**ALEIXO (A.). A organização dos serviços antivenereos no Estado de Minas e, mais especialmente, na sua Capital.** [The Anti-Venereal Campaign in the State of Minas, particularly in the Capital.]—*Brazil Medico*. 1923. Nov. 3. Year 37. Vol. 2. No. 18. pp. 271-274. [1 ref.]

Nine dispensaries have been set up, two in the Capital and seven in the interior. Details are given of 7 dispensaries. At one in the Capital, established in 1921, there had attended 4,281 patients with syphilis, 1,408 with gonorrhoea, 816 with soft sore. Prophylactic measures may be summed up as consisting of treatment, educational methods, and examination of prostitutes. It is estimated that 95 per cent. of the latter presented themselves. Efforts are made to trace the source of any fresh case that arises.

Syphilis has been greatly reduced, namely from 16.6 per cent. in March 1922, to 4.7 per cent. in August 1923, at the Central Dispensary referred to above, but other venereal infections show no such improvement. Thus, gonorrhoea and soft sore in March 1922 were 18.8 and

15.1 per cent. respectively, whereas in August 1923 they were 20.1 and 15.8 per cent.\*

SAWYER (W. A.). **Advantages of Nation-Wide and International Organization for Disease Control, with Special Reference to Hookworm Disease and Beri-Beri.**—11 pp. 1923. Singapore: Govt. Printing Office. [5 refs.]

The writer commences the article with the following paragraph:—

“A new governmental health function is apt to develop in several stages. In the first, the underlying facts are uncovered in the laboratory and the field, and the public health dreamers of dreams conceive plans for applying the new knowledge for the benefit of the people's health. The second period is a prolonged interval of delay and preparation during which the problem is gradually forced into world-consciousness through discussion. Then there may follow the third stage, the exhilarating campaign period, in which the movement is in the lime-light and methods are rapidly improved through abundant experience and the clash of many minds. Finally the project settles down into its place as one of the recognised permanent functions of government.”

Making use of the hookworm statistics in Australia, he argues the case for a national and international organization of direct operation practically throughout the world. He quotes from Dr. SWEET's report the results of the anti-hookworm investigation up to 31st. Dec. 1922 [see this *Bulletin*, Vol. 20, p. 954]. The tables are too long to be given here in extenso, but in endemic areas there were 10.5 per cent. of the population infected on a gross total of 145,000; in non-endemic areas there were .8 per cent. of the population infected on a gross total of 50,000 persons. Special investigations in Papua gave 59.2 per cent. New Guinea 74.2 per cent., Endemic Coal Mines, Queensland 38.5, and Hospital for the Insane in Queensland 16.6 per cent. The regions investigated include many tropical areas with a rainfall from 50 ins. to as low as 10 ins. Under the conditions found in Queensland hookworm infection in people of European origin was very high where there was more than 50 ins. of rain in a year and as a rule almost absent where the annual rainfall was less than 40 ins.

“After the work was well under way, the important observation was made that the methods used at first were too intensive, and that better results could be gained if less effort was devoted to securing complete cures of all infected persons, and more emphasis was placed on visiting the communities often, under a systematic scheme of permanent hookworm control. There was much evidence to show that for a given set of conditions there is a level at which the hookworm infection rate is at equilibrium.”

In Papua and New Guinea much relief was obtained by mass treatment of the populace, the education necessary to get these people to use latrines being naturally rather a slow process.

The writer's remarks on beriberi will be dealt with in another review.

PUBLIC HEALTH REPORTS. 1923. Oct. 12. Vol. 38. No. 41. pp. 2368–2370. With 1 plate.—**Campaign against Hookworm in the Province of Cebu, Philippine Islands.**

The writer gives an account of an anti-hookworm campaign in the province of Cebu in the Philippine Islands. At the outset, notice of

\* Summarized by Dr. H. Harold Scott.

the intended operations was given through the Municipality and schools. On the day of examination circulars were distributed with the following instructions.

"(a) Come to-day to be weighed and to receive an identification card.

"(b) Do not eat anything to-night or to-morrow morning.

"(c) Come early to-morrow morning to.....(name of place where treatment is to be given.)

"(d) Come provided with a mat (on which to lie down), and a basin.

"(e) Come early and be examined by Dr.....

"(f) Bring your identification card."

Pictures were freely distributed of the following :—

"(a) Pictures of adult hookworms and eggs.

"(b) Insanitary privy showing how hookworm is spread.

"(c) Young worms entering the body through the skin.

"(d) Sketch of the body, showing route of worms when entering, including veins, arteries, heart, lungs, trachea, esophagus, stomach and intestines.

"(e) Illustrations showing lowered resistance of victim, making him an easy prey to other diseases.

"(f) Modes of spread of hookworm disease and other diseases due to improper disposal of human feces.

"(g) Sketch of an intestine bearing hookworms, some of which are hanging to the intestinal wall.

"(h) Sanitary toilet.

"The medicine used in the treatment was purified carbon tetrachloride, put up in bottles of one liter capacity. One cubic centimeter was given for every 5 kilograms of body weight, the maximum dose being 12 cubic centimeters. Advanced heart, liver, or kidney diseases were considered as contra-indications, as were also pregnancy and edema, unless the latter was due to hookworm infection.

"Of the 2,556 persons treated, only 7 showed resulting untoward symptoms. In three cases there was great weakness. These patients were treated by injections of strychnine and camphor and recovered. In four cases there was excessive vomiting, which was treated with injections of morphine and strychnine; and in the case of one child, paregoric was given in tea."

The results of the examination of the dejecta are given below.

		Dumanjug.	Ronda
		Per cent.	Per cent.
Infection with one or more species			
of intestinal parasite ...		100	100
With hookworm	... ..	93	82
With ascaris	... ..	83	70
With trichuris	... ..	76	40

The 2,556 patients were treated in 18 days, an average of 142 per day and a maximum of 435. The continuation of lectures, posters and treatment proved very satisfactory and popular.

**FAR EASTERN ASSOCIATION OF TROPICAL MEDICINE.** **Statements laid before the Committee on Beri-Beri Control and the Resolution recommended by the Committee as amended by the Council and passed at the General Meeting of the Fifth Congress of the Far Eastern Association of Tropical Medicine, 1923.**—12 pp. 1923. Singapore: Govt. Printing Office.

The subject of beriberi was much discussed at the 5th Congress of the Far Eastern Association of Tropical Medicine by the delegates from

Indo-China, Philippines, Japan and Formosa, India, Australia, Siam and Dutch East Indies. Many conflicting opinions were expressed and the administrative difficulties of the proposals were brought out by many speakers.

The result of the deliberations is given in the following resolutions.—

"The Association is of opinion that, consequent upon the divergence of views disclosed in the statements of the official delegates, any international convention is at present impracticable.

"The Association reaffirms its opinion that beri-beri is a disorder of nutrition, and that in the Far East the principal factor in its causation is a diet of which overmilled rice forms the staple.

"The Association recommends that interested Governments be invited to promote further research in the following questions in relation to beri-beri control :—

- (a) the standardisation of rice ;
- (b) the effects of transport and storage on rice ;
- (c) economic considerations.

"The Association recommends that each of the Governments interested and the International Health Board of the Rockefeller Foundation be invited to nominate a representative on a 'beri-beri committee' which shall report at the next Congress. The names of such representatives should be notified to the General Secretary-Treasurer.

"The Association considers that, in the meantime, individual Governments should take such action for the control of beri-beri as may be suited to local conditions in their respective countries, and should devote special attention to devising and applying practical methods of improving the diet of the general population with regard to the too exclusive use of over-milled rice, and should be requested to make available to the next Congress of the Far Eastern Association of Tropical Medicine systematic observations and statistical data showing the results of these methods.

"The Association considers that educational methods of control on the bases of the available scientific knowledge should be vigorously applied in all countries."

CATHCART (G. E.). **Notes on the Use of Artificial Light in Sandfly Destruction.**—*Jl. Roy. Army Med. Corps.* 1923. Dec. Vol. 41. No. 6. pp. 447-450. With 2 figs.

The writer gives an account of his experiences in Irak with the use of an ordinary hurricane lamp in the destruction of sandflies at night. He observed that if a lighted hurricane lamp, carefully smeared all over with vaseline, were hung at a certain distance from the beds it became coated with sandflies and in this way destroyed many thousands of these pests. Also that by rubbing a chemical repellant on the exposed skin it was possible to obtain a fair night's sleep. He considers that this matter is worthy of further and more exact investigation and also suggests that possibly the hurricane lamp plan might work with mosquitoes.

## WATER.

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1923. Sept. 7.  
Vol. 64. No. 1651. pp. 167-169. With 3 text figs.—**Rand  
Water Supply. Description of the Vaal River Scheme.\***

The main feature of this scheme is the construction of a barrage across the Vaal River near Vereeniging which will create a lake capable of impounding 13,633 million gallons. The length will be about 40 miles and the width 4,000 ft. ; submerged area  $6\frac{1}{2}$  sq. miles and depth of water at the barrage 25 ft. 1 in. The water brings down a large quantity of silt in the wet weather, estimated at 1,200,000 tons. The original width of the river at the barrage site was 620 ft. but the length of the barrage is 1,400 ft.

"The water from the river intake station, before being delivered into the sedimentation tanks, is treated with sulphate of alumina and the water is then run along a trough arranged with baffles, so that thorough mixing takes place. The water then enters the sedimentation basins, four of which have been constructed to deal with a total of 6,000,000 gallons per day. The sedimentation tanks are 260 ft. long, 70 ft. wide, and have an average depth of about  $8\frac{1}{2}$  ft. ; the capacity of each tank being 800,000 gallons.

"Temperature variations in the long concrete side walls have been provided for by inserting expansion joints made of V-shaped copper plates. The walls and floor slabs are of reinforced concrete, and the slab is laid on a 9-ins. bed of puddle.

"The slow passage of water through these tanks enables the flocculent precipitate, caused by the sulphate of alumina, to settle at the bottom, and carry down with it the greater portion of the suspended matter and bacteria. It is anticipated that over 80 per cent. of the bacteria will be removed in the tanks by adding from  $1\frac{1}{2}$  to 3 grains of sulphate of alumina per gallon of water. After the water leaves the sedimentation tanks it is passed through a set of eight Paterson filters, and the clear water from these filters is collected in a reservoir holding 200,000 gallons situated in the basement under the central portion of the filter house.

"The sludge, which will amount to about 8,500 tons per annum, is removed by washing it to a central drain, and then into a sump from which a pipe has been laid to a site about 2,700 ft., distant from the main station. The sludge gravitates to the site in question, and it is then spread over an area of land 30 acres in extent."

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1923. Oct. 12.  
Vol. 64. No. 1656. p. 265.—**Deferrising Water in Berlin.**

"Water at Berlin is derived from wells, and has an iron content which has doubled during the last six years. It also contains hydrogen

\* Works necessary to bring a supply of 5 million gallons a day from the Vaal River to the Rand were commenced in 1920, and this unit, which includes a large barrage, was formally inaugurated by Prince Arthur of Connaught on July 27th. A second unit of 5 million gallons a day has been approved, but the work has not yet been put in hand.

sulphide and carbon dioxide, and the volume treated by the new plant is over 17,000,000 gallons per day in the summer months. The Berlin water was formerly treated for iron removal by aëration and slow sand filtration, but in the new iron and manganese removal plant, impinging jet aërotors are used with prefilters or scrubbers, and the water is then treated in mechanical rapid filters. Both sets of filters are worked at high rates. An injector wash is used in the final filters after the ordinary reversed flow and compressed air wash has become ineffective. The ferrous iron in the water is oxidised rapidly by the aëration, and is precipitated, and the hydrogen sulphide and carbon dioxide present in the water are removed at the same time. The drops of water from the aërotor are caught on prefilters containing gravel from 6 to 10 mm. in gauge, 24 in. deep, resting on a false bottom of perforated copper plates and covered with a copper screen in order to prevent displacement in washing. When the gravel has become clogged with iron the filter is washed by reversing the flow. The treatment is very efficient. It is noteworthy that the wells from which this supply is drawn, 154 in number, some of which are 200 ft. deep, are lined with seamless copper tubes."

O'CALLAGHAN (J. P.). **Modern Methods of Water Purification.**—*Surveyor & Municipal & County Engineer.* 1923. Sept. 14. Vol. 64. No. 1652. pp. 195–196.

The permutit zeolite process.—

"The name 'zeolite' was applied to the hydrated silicate of alumina combined with sodium, potassium, calcium, magnesium, and other metals. These substances possessed the remarkable property of exchanging their metallic bases for others under appropriate conditions of contact, and of effecting the exchange in the reverse direction. For instance, a zeolite containing sodium as its base was able to replace the sodium with calcium if exposed to contact with a solution of a calcium salt. When the calcium zeolite had been formed, it could be readily reconverted into the sodium salt by similar treatment with a solution of sodium chloride. By the power of base-exchange which permutit possessed 'permutit' was the name adopted for the water softening zeolites—both calcium and magnesium were completely removed from water which had passed through a permutit softener. All traces of hardness disappeared, and the water, when tested, gave a ready lather with a minimum quantity of soap. The softeners were without moving parts, the entire process consisting of the simple filtration of the hard water through a bed of the permutit material. The installation of plant of the largest size, therefore, presented little difficulty, while, as regards the permutit itself, depreciation was a practically negligible item, and the labour required to operate was exceedingly small. As the softening power of a permutit plant was drawn upon by the water itself in exact accordance with its hardness and its rate of flow, it followed that permutit softening precluded the possibility of under-treatment or over-treatment. Variation in the quality and quantity of the water within the limits of the capacity of the plant made no difference, whereas in such cases of variation a lime-soda water softener would require frequent readjustment.

"The permutit system worked equally well whether operated under pressure or by gravity, and, in consequence, a softener could be fixed to the water service at any convenient level. This frequently saved

double pumping, and allowed of a practically unrestricted choice of position for the softening plant.

"The base-exchange softening action continued until the active sodium in the permutit molecule had been entirely replaced by calcium and magnesium. When this point had been reached, regeneration was effected by passing a solution of sodium chloride slowly through the filter; by this means the calcium and magnesium, as soluble chlorides, were expelled from the permutit, their place being taken by sodium from the salt solution, thus reconstituting the original sodium permutit, which was then as fresh and active as when first put to work. The alternating cycle of softening and regeneration was capable of indefinite prolongation. Permutit filters, which had been in uninterrupted use for fifteen years, and had been regenerated many thousand times, were still delivering water of zero degrees of hardness containing not the slightest trace of lime or magnesia."

**FOWLER (Gilbert J.). Bio-Chemical Factors in Modern Methods of Water Purification.**—*Surveyor & Municipal & County Engineer.* 1923. Dec. 28. Vol. 64. No. 1667. pp. 523-524.

The writer gives an account of what may be termed the true natural forces at work in a surface water, whether it be river or lake. He reviews also the subject of chlorination of drinking supplies.

The writer, it must be remembered, is the discoverer of the Activated Sludge process of sewage purification. He considers that something akin to this process is actually going on slowly in the rivers in tropical countries. He instances the conditions which he found in the river Yangtze, which flows through plains that are extremely heavily manured with sewage.

"The water of the Yangtze and its tributaries exhibits but slight signs of pollution save the presence of nitrates, the products of oxidation of sewage. The water, however, is heavily charged with finely divided silt, and it occurred to me that this silt served as a nidus or scaffold for the necessary bacteria of oxidation, and that consequently self-purification took place very rapidly, and that we had really to deal with an activated silt which purified the polluted water much in the same way that activated sludge purifies sewage."

The inference drawn by the writer is that a modification of the aëration process, which is the foundation of the activated sludge treatment, would probably be found extremely useful in oxidizing the impurities in a drinking water.

**BONNE (C.). Ervaringen met mechanische snelfiltratie en chloorbehandeling van rivierwater te Moengo, Suriname.** [Results of Filtration and Chlorination of River-Water at Moengo, Surinam.] —*Tijdschr. v. Vergelijk. Geneesk. enz.* Leyden. 1923. Nov. 14. Vol. 9. No. 4. pp. 316-330. [English summary pp. 330-331.]

Summary.—

"Filtration of dark but non-turbid and not heavily polluted river-water in Surinam with a mechanical pressure filter after addition of alum, soda and chlorine gas has given satisfactory results. Details about chemical analysis, number of bacteria, coli reactions, amount of colour, etc. in riverwater and filtered water and also a description of the plant, difficulties and costs of operation, can be found in the original article."



Illustrating Wood (C.I.).]



FIG. 12.—Method of boiling drinking water for use in camp. Front view of furnaces, showing drums in place. The door to the furnace at the right is removed to show the inside of the fire-box. The collecting and cooling tank is shown to the right of the furnace.

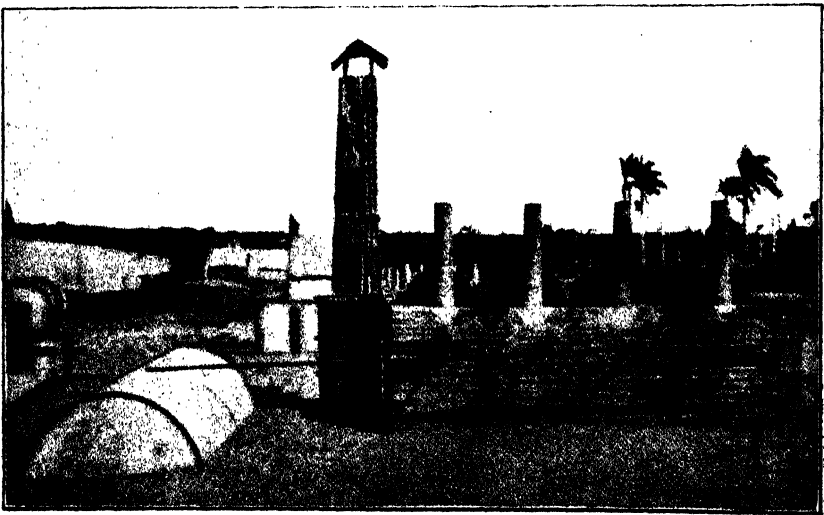


FIG. 13.—Rear view of furnace, showing smokestacks and pipes for transferring the boiler water from the drums to the tank.

[Reproduced from the *United States Naval Medical Bulletin*.]

WOOD (C. I.). **A Method of boiling Drinking Water for Use in Camp.**—*U.S. Nav. Med. Bull.* 1923. Aug. Vol. 19. No. 2. pp. 166-167. With 2 figs.

The writer describes an ingenious way of providing boiled water for a garrison of 300 men stationed at Santiago, Dominican Republic. He used large gasoline drums, building a grate with masonry. The pictures explain this and do not require description.

Dotted all over the Bush in Central Africa and in many camps in Mesopotamia would be found very similar arrangements made by our forces during the war, the only difference being that nothing so satisfactory as these steel gasoline drums was available; recourse had to be made to the kerosene oil can and the structural arrangements were practically always of mud.

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## FOOD.

BALFOUR (Andrew). **Some Food-Stuffs in the Tropics.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1923. June 21. Vol. 17. No. 3. pp. 151-176. [60 refs.]

This paper is a complete review of the vexed question of the milk supply in tropical countries, and also deals with several other articles of diet, particularly cereals, soya beans, ground nuts and tropical fruits.

The writer points out that tuberculosis amongst cattle in hot countries is well known to be comparatively rare. He quotes analyses of milk from BLACKHAM's and JOSHI's work in Bombay.

As regards remedial measures for the state of the milk industry he considers that very little can be done in the present state of education in most oriental countries. With this we are in entire agreement. The following points are well known to all sanitarians in the East:

- (1) That any remedial measure enforcing pure milk puts the price up beyond the means of the ordinary town dweller.

- (2) That the native milk vendor or cow owner can always succeed in defeating any legal enactment that is made with the endeavour to improve the quality.

As the writer points out, there is only one remedy, and that is to create a demand for the pure article, which certainly does not exist at the present time.

As substitutes for milk, condensed and dried milk are dealt with. The writer believes that the demand for dried milk in tropical countries is likely to increase, particularly for the feeding of European children.

Apropos of soya beans, it is pointed out that the Chinese use practically no dairy produce, yet they have succeeded by the use of this article of food in living on what is a well-balanced diet.

The writer quotes the work by Mackenzie WALLIS on the new proteid substances which he discovered in ground nuts; bread and biscuits can be made from this material which has a high degree of digestibility and is a very sound food, being rich in anti-beriberi vitamin.

A very extensive bibliography is appended.

PORTER (Annie). **On the Effects of Cold on the Vitality of Certain Cysticerci and Echinococci in Meat kept under Commercial Conditions of Freezing in Johannesburg.**—*Publications of the S. African Institute for Medical Research.* 1923. Feb. No. 16. 49 pp. [12 refs.]

It is impossible to abstract the technical details of this paper, but the conclusions, which are of very great importance to all Sanitary Officers everywhere in the East, are given *in extenso*.

"The present investigation has dealt with the effect of continued cold on the viability of the cysticerci of *Taenia solium*, *T. saginata* and *T. crassicolis*, and on the echinococcus of *Taenia echinococcus*, the flesh of infected hosts being frozen under the commercial conditions possible at an abattoir such as that at Johannesburg.

"Tests for viability of the various larval forms of the afore-mentioned tapeworms were based on the morphology, motility and staining reactions of the cysticerci or echinococci, and on their power to develop into adult tapeworms in experimental animals (dogs and kittens) in the cases of *Taenia crassicolis* and *T. echinococcus*. Animal experiments with *Taenia solium* and *T. saginata* failed, as has been the experience of other workers, and these adult tapeworms seem to be specific to man.

"Staining reactions proved to be the most satisfactory means of testing the viability of *Cysticercus bovis* and *C. cellulosae*. Methyl green slightly acidulated with acetic acid was the most satisfactory stain of those used. Dead cysticerci stain relatively deeply and rapidly compared with control living cysticerci from freshly killed beef or pork. Deepseated cysticerci should be used for staining tests.

"Cysticerci and echinococci frozen for short periods have retained their vitality as judged by staining reactions. The administration of meat containing hydatids of *T. echinococcus* frozen for 30, 43, 61 and 70 days to clean laboratory-bred dogs has resulted in infection with *Taenia echinococcus*. Similarly, freezing for a month was found experimentally not to have destroyed the vitality of *Cysticercus fasciolaris*, as adult *Taenia crassicolis* were obtained in clean laboratory animals after feeding on the frozen cysticerci. By analogy, freezing for short periods is not likely to kill *C. bovis* or *C. cellulosae*, and this is confirmed from consideration of the staining reactions and morphological condition of these cysticerci under similar conditions of experiment.

"Deepseated cysticerci remain alive after freezing when surface ones are killed, as judged by staining reactions and morphology. Cysticerci protected by fat are still living when unprotected ones have been killed by freezing. Motility tests for viability were found undependable and unsatisfactory.

"Physical degeneration in any form, lack of motility under the influence of warmth and rapid taking up of stains, as a total picture, are probably indicative of the dead condition of the bladderworms under investigation.

"Freezing at temperatures ranging from  $-5^{\circ}\text{C.}$  to  $-18^{\circ}\text{C.}$  for a period of about ten weeks appears to destroy the vitality of all the cysticerci in carcasses of beef and pork. For safety, a margin should be allowed on this period of freezing, and it is suggested that a period of at least twelve weeks' freezing of slightly infested beef or pork at a temperature of  $14^{\circ}\text{F.}$ , that is  $-10^{\circ}\text{C.}$ , should be undergone before the meat may be regarded as sterile, and the cysticerci as dead.

"In regard to the suitability of frozen measly meat for human consumption, the experimental evidence goes to show that if such meat be frozen for twelve weeks the contained cysticerci are unlikely to develop into tapeworms in the human digestive tract. Nevertheless, the nutritive value of the meat and its keeping properties are less satisfactory than those of normal frozen meat. Where heavy infestation of a carcass occurs, in my opinion, such a carcass should not be used for human food, even if frozen for twelve weeks. Where the bulk of the parasites is large, meat so infested cannot be considered either wholesome or nourishing. Total loss to the owners can be avoided by the consignment of such carcasses to the inedible-tallow works or the fertiliser plant, as is done in South America.

"Meat very slightly measled, so that the cysticerci detectable could be removed and the remainder issued almost certainly as normal, might profitably be frozen for twelve weeks and then be issued for consumption, preferably under declaration of its nature, instead of being condemned. As before mentioned, under pre-war conditions, the Freibank system of Germany dealt with the meat containing measles as follows:—The meat in question was never heavily measled. The measles were removed, the meat was frozen for three weeks, then cooked thoroughly by the Municipality and sold under declaration of its nature at reduced rates, under the name of 'spoiled meat.' Heavily infested carcasses were sent to the inedible tallow factories, and when as many products as possible had been extracted the remains were passed on to the fertiliser plant. A similar system holds at the present time at the great meat exporting centres in the Argentine. In the absence of such a system, it is obvious that more care is necessary in dealing with meat infested with measles, and much longer periods of freezing are necessary than have been used previously to ensure the death of the bladder worms."

## CONSERVANCY.

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1924. Jan. 18. Vol. 65. No. 1670. p. 52.—**The Evolution of Sewage Disposal.**

"There is much interesting information to be gathered from a perusal of some of the various pamphlets, reports, and papers issued in the middle of the last century on the subject of sewerage and sewage disposal.

"It must be remembered that early in 1800 scarcely any water-closets existed, as Bramah had only quite recently invented his ingenious but cumbersome apparatus. All human excreta was deposited in either privies, middens, or night stools. There were a few cesspools or 'fosses' as they were then called, in some of the larger towns, but no drains or sewers as we now know them.

"Even so late as the year 1865, from a return given in a report of one of the numerous Government Commissions which were then being held to inquire into the question of sewage disposal, it appears that with regard to the large Continental towns or cities 'the use of privies is very general, water-closets being rare even in large towns, and the usual method of dealing with human excreta is to allow it to collect in pits . . . . For instance, in Berlin, with a population of about

600,000, there are said to be no fewer than 50,000 night stools in use.' In the United Kingdom things were a little better, as the introduction of water supplies under pressure had given a great impetus to the installation of water-closets in houses and the provision of systems of sewerage.

" But the question of the ultimate disposal of the sewage from the sewers was still a matter of dispute and inquiry. Copious reports were issued by commissions, congresses, scientific societies and eminent sanitary engineers.

" In October of the year 1866 a congress on the subject was held at Leamington, the then Lord Leigh was president, and the conference was attended by many of the leading sanitary engineers of the day.

" The conclusions arrived at are very interesting at the present date, as they utterly condemned the water carriage system of dealing with excreta. It was considered that 'the cause of failure in our sanitary arrangements, and the many evils which have arisen out of them, have been clearly proved to be owing to the unnatural admixture of human excreta with large quantities of water, and to the prevailing custom of employing water as the vehicle for their removal out of our houses,' and that in place of water we should resort 'to the natural agency of earth, which is as old as the Creation itself, and is comprised in the law of 'earth to earth,' and which law must again be strictly enforced.'

" It is almost pathetic to read these words of fifty-eight years ago in view of our present knowledge, but at the same time we should humbly confess that possibly in the year 1983 our present views as to the proper methods of dealing with human excreta and the purification of our sewage may be regarded in the same manner as we regard the views expressed about half a century ago.

" Fortunately the expressions of opinion of that important congress were not accepted as practical, and the water carriage system gradually became generally adopted.

" But the pressing problem of how to deal satisfactorily with sewage remained still unsettled. It would take many pages of this journal to describe or even enumerate the large number of processes that were patented and tried for many years in order to arrest the decomposition of water-carried sewage and to purify the effluent. Between the years 1865 and 1875 upwards of 400 patents dealing with the problem were granted. All the processes that were tried were costly to instal and expensive to carry on, and were all more or less failures; but some of the best of them were carried on for many years on the assumption that it was necessary to arrest decomposition. It was not till the light broke on our vision and it was found that decomposition was our friend and not our enemy that these more or less futile attempts were abandoned. What was known as the septic tank treatment changed our views on the subject and revolutionised the preceding attempts. Decomposition, or 'the act of separating the constituent elements of a compound body or substance' is the real law 'as old as the Creation itself,' and this system almost at once superseded the multitudinous chemical and other processes which had been found to be failures.

" Many alterations and improvements were from time to time effected in the methods employed to perfect the process which was introduced about thirty years ago, and is still satisfactorily working in hundreds of cases. More recently a further development has taken place by the introduction of what is known as the activated sludge process, which is

making rapid progress. It is practically on the same lines as the septic system, as aëration has always taken an important part in sewage purification. Oxygen appears to be not only a great life-giver but also a purifier, and possibly the future may reveal to our scientific investigators some further glimpses into Nature's forces which are no doubt available for our benefit if we could only discover them and harness them for our use."

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1923. Nov. 23. Vol. 64. No. 1662. pp. 381-382.—**The Drying of Activated Sludge.**

"Experiments have been made at Sheffield in which the sludge from the bio-aëration plant have been regularly applied to prepared ash filters consisting of 18 in. to 24 in. of graded clinker, or cinders with good drainage, the top layer being fine ash about 4 in. thick. During the past twelve months this sludge has been regularly applied in 6-in. layers to the filters, and has been allowed to stand from eighteen to twenty-four hours, after which the cake has been removed by shovels. The filter has been raked over and allowed to dry for twenty-four hours and a further 6 in. of sludge applied. Other experiments of considerable interest have been made, namely, with sludge laid on a band of paper-maker's gauze travelling over a vacuum box, with the acid treatment used in America, also with centrifuges. It is found possible to effect considerable decrease in bulk by means of the centrifuge, but the product is only a semi-liquid mud. By the prolonged settlement of wet sludges a considerable separation of water has been effected; by applying flotation processes with air or other gases such as are used in the separation of mineral ores, rapid separation of large quantities of water can be obtained. Mr. Haworth concludes that the drying of sludge on suitably prepared ash or sand filters appears to be the most profitable and economical method at the present time. There can be no doubt from the very clear evidence given by Mr. Haworth that the de-watering of sludge ought no longer to be considered an obstacle to the adoption of the process. Mr. Haworth's paper and work are deserving of the very highest commendation."

WATSON (John D.). **Sludge Digestion.**—*Surveyor & Municipal & County Engineer.* 1923. Nov. 23. Vol. 64. No. 1662. pp. 383-384.

"The sludge is transferred from a given sedimentation tank into the selected digestion tanks (generally five or six in number) by the main set of pumps; simultaneously some of the ripest of the available sludge is pumped from a digestion tank into the same delivery main in the proportion of 1 to 4, thus inoculating at the earliest moment the fresh sludge with fermentative organisms.

"It was observed quite early that inoculating raw with ripe sludge had an excellent effect upon the speeding-up process. In addition, steam from one of the Lancashire boilers, when it is available, and in cold weather, is injected into the delivery main to encourage temperature conditions most favourable to fermentation.

"The average analysis of the sludge is as follows:—

	1915-18 inclusive.	1919-22 inclusive.
Water ... ..	92.5 per cent.	92.0 per cent.
Dry solid matter ... ..	7.5 per cent.	8.0 per cent.
Specific gravity—wet sludge ... ..		1.0256 per cent.
Specific gravity—dry solid matter ... ..		1.50 per cent.
and the average analysis of the dry solid matter is—		
Matter volatile at red heat ... ..		58.5 per cent.
Matter non-volatile ... ..		41.5 per cent.
Total nitrogen ... ..		2.71 per cent.

"The rotted sludge, or residuum of the fermentation process, is pumped direct to the drying beds, which consist of  $\frac{1}{2}$ -acre plots of engine ashes, the total area being about 60 acres. All the plots are underdrained with 4-in. agricultural pipes, laid in a herring-bone fashion toward a main leader which conveys the drainage to a well, whence it is pumped up to a percolation filter.

"Each drying bed is formed by earthen banks about 2 ft. high, and the sludge is deposited to a thickness of 18 in. ; it dries down to about 6 or 7 in.

"The time required for drying varies with the weather. In dry weather it quickly cracks and admits air, but in our climate it would be rash to assume that it is possible to dry more than two fillings per annum.

"The area is provided with a system of permanent 2 ft. gauge tramways laid to suit locomotive haulage, and provided with conveniently placed turnouts and crossings to allow temporary rails to be laid through the beds for the collection of dried sludge.

"When the sludge is removed from the drying beds it is delivered by light railway to the contractors for storage and treatment in their immense sheds, which stand on about 7 acres of ground. The sludge is broken up and spread in a thin layer on the floors of the sheds, which are so constructed that the wind can blow through them. The length of time it takes to dry depends upon the atmospheric conditions.

"When it is sufficiently dry it is collected and ground into a fine meal and screened so that all foreign substances are eliminated. The meal in this condition is then stored and makes an excellent base for a fertiliser. The finely-ground condition of the meal is one of the chief factors which influence its availability to the crop, as it is obvious that the finer the particles the more rapidly the agencies in the soil effect the necessary chemical and bacterial changes.

"Our contractors fortify it with sulphate of ammonia, bone phosphates and sulphate of potash. It is then bagged and despatched by rail for application to the land.

"The process of sludge treatment is put forward as a complete process in itself, just as the Imhoff tank process was put forward by the German engineer, but without in this case any suggestion that the effluent from the sedimentation tank could be discharged into a stream."

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1924. Jan. 18.  
Vol. 65. No. 1670. p. 45.—**Economical Results [Activated Sludge] at Withington.**

"In a report contained in the appendix to the City of Manchester Rivers Department Annual Report, Dr. Ardern and Mr. William

Lockett show how they have managed to increase the effective capacity of the activated sludge plant at Withington by 25 per cent. without incurring a corresponding increase in the cost of operation. They have further shown that under proper control the process is so elastic as to render the treatment of large volumes of storm water a comparatively simple matter. These results have been obtained in consequence of an investigation made with respect to the conditions controlling the character and activity of the sludge, especially with regard to sudden and abnormal bulking of the sludge in circulation. Bulking generally results in the temporary loss of control of the activated sludge in circulation, settlement is protracted and the resultant effluent is adversely affected. Microscopical examination indicated that bulking was associated with protozoal and bacterial growth; it was then found that prolonged aëration of bulked sludge resulted in marked reduction of these growths. Subsequent investigations, however, established the fact that under suitable aëration conditions, the control of the process could be well maintained without reference to the higher organisms contained in the sludge. For each individual sewage there is a more or less definite minimum limit of air supply necessary for satisfactory operation of the process. It was proved that the total solids per hundred c.c. of sludge reach a maximum during periods of prolonged wet weather in the winter months, and a minimum in periods of prolonged drought, or when there has been any tendency to operate the plant at a rate of flow beyond its maximum effective capacity. With this information available it became possible to predict the effect, on the physical condition of the sludge, of the variation in the character of sewage treated; and the volume of sludge to be removed could be gauged with precision. Also, in conjunction with information yielded by the study of the dissolved oxygen content of the mixed liquor in the aëration chamber, it has been found possible to increase very materially the maximum rate of operation during periods of high dilution, and thus to deal with a volume greatly increased during wet weather, the air consumption on the basis of air consumed per gallon of sewage comparing to advantage with the results previously ascertained.

"It is estimated that the cost of treatment at Withington per million gallons, based upon a 60 per cent. efficiency air plant and electrical energy at 7d. per unit, including attendance and materials, is £2 5s. 3d. As a consequence of these investigations a large new installation was built out of revenue funds accumulated for the purpose of the renewal of the filters because it was seen that the outlay would be expended to much better purpose; and it is further anticipated that the consequent future reduction in the load on the filters will result in a large saving of annual expenditure, and that this sum will be considerably in excess of the probable cost of operation of the new plant. The effluent will be of better quality than before, and everything tends to show, after long and careful investigation, that the new process is more economical and efficient than any possible alternative carried out on the older lines."

**SHENTON (H. C. H.). Sanitary Engineering : a Review of Present-Day Practice.**—*Surveyor & Municipal & County Engineer*. 1923. Sept. 14. Vol. 64. No. 1652. pp. 187–190.

**America and Activated Sludge methods.**—

"The sludge at Houston was disposed of, with substantial success, by lagooning, and at Chicago there was land available on which lagoons



could be located, to which the sludge from activated sludge plant might be discharged by pumping through pipe lines several miles in length.

"A summary of operations of the MacLachlan process at Houston was then given. The plant consisted of a conditioning unit made up of a special rotary sulphur burner with pressure blower, which conducted sulphur dioxide fumes into a gassing tank, where the flow of raw sludge was impregnated and put into shape for a quick filtration. The conditioning unit was followed by two continuous sludge filters each having a filter drum 40 in. in diameter and 84 in. long. The system had been in operation about three months, during which time numerous minor mechanical refinements had been introduced, so that the machines were now operating twenty-four hours daily. Each machine turned out an average of 850 lb. of sludge cake per hour, the cake averaging 79.8 per cent. water and ranging from 77 to 81 per cent. The recovery of the solids on the filters was averaging 74 per cent., and the sludge averaged 99.5 water. The conditioning unit and two sludge filters were using a total of 9 h.p. and the sulphur requirement was averaging 40 lb. per hour to condition the sludge feed to both machines. The labour requirement was one man per shift. The continuous filters resembled those used at paper mills to remove pulp from waste water.

"At Milwaukee it was understood that the sludge would be acidified, heated to 160° Fahr. and filtered through a vacuum filter to produce 80 per cent. water content. This product would be dried to 10 per cent., screened and crushed. An output of 100 tons was expected daily of dried sludge containing 7 per cent. nitrogen, of which 70 per cent. was available as fertiliser. Unanimity of opinion had not been obtained as to the best arrangement of presses and driers. Data as to dewatering from one city should not be taken too literally for application elsewhere, on account of variations in the composition of sludge."

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1923. Sept. 7. Vol. 64. No. 1651. p. 165.—**Hot Water Supply and Sludge.**

"One of the papers read at the recent congress of the Royal Sanitary Institute at Hull raised the question of the possibility of utilising the gas generated in sludge tanks for heating a public hot water supply. . . . There is no possible doubt that much gas is generated which could be used, and that this is absolutely wasted. Given the sludge, there is as much certainty of obtaining an explosive gas capable of doing work as there is in the case of an equivalent quantity of coal.

"This gas has been used at sewage works for engines and lighting. There are, however, difficulties which are not to be ignored. The production of gas varies with the temperature and with other conditions. In a hot climate the possibilities are much greater than in a cool climate. Mr. Watson, of Birmingham, has run a 25 h.p. engine with this gas, but he finds that with sludge at a temperature of 50° little gas is produced. He considers the optimum temperature 90°. Mr. Martin gives as a safe figure a daily yield of 1 cubic ft. of gas per head per day, but there is no doubt that the yield could be increased by adding simple substances like paper to the sewage. Another difficulty is due to the fact that this gas may be poisonous. It appears, however, that this view was not taken by the authorities at the Leper Hospital at Matunga (near Bombay), where the sewage was pumped, the buildings lighted and the patients' food cooked by means of the gas produced from

the sewage. Mr. Martin, in quoting this instance, clearly proves the possibility of his suggestion.

"Sludge digestion tanks are certainly a very important feature in modern sewage works, and it is from these tanks rather than from septic tanks that the gas would be obtained. Mr. Martin calculates that the money value of this gas would be considerable. For a town of 50,000 inhabitants its value would be about £3,500 per annum, for Birmingham £66,000, and for London £374,000 per annum. Mr. Martin shows that although temperature may affect the rate of gas production, there is no evidence that digestion is less complete at British temperatures, and thus the total evolution of gas will be the same in both cases. The only difference is that more storage room must be provided in this country than in the tropics. He argues that the gas produced from the sludge of a large community might be used to heat water in a group of smaller houses. Thus the gas from a population of 50,000 persons might heat water for 570 houses. The gas would cost nothing so far as its manufacture was concerned, the only expense would be storage and distribution."

HOTCHKISS (Margaret) & MURRAY (T. J.). **The Relative Prevalence of Bacteria in an Imhoff Tank.**—*Amer. Jl. Public Health.* 1923. July. Vol. 13. No. 7. pp. 562-567. With 3 charts in text.

This paper gives some interesting and valuable results on the various bacteria present in the Imhoff Septic Tank, but it is

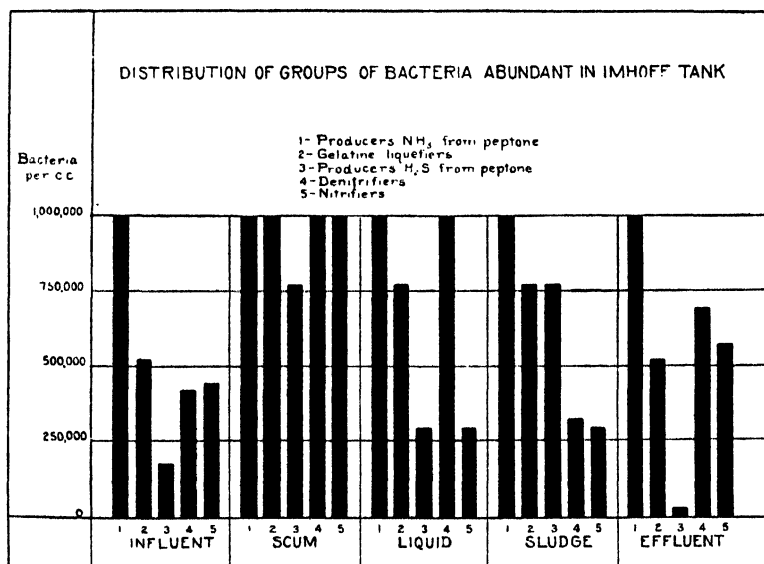


CHART I

FIG. 14.—Shows that nitrifiers and denitrifiers are present in about the same numbers in the influent; but that with the exception of the scum, the denitrifiers tend to increase and the nitrifiers to decrease. Oxidation of ammonium salts to nitrite and nitrate occurs in all parts of the tank, but only in the scum is there an increase in the numbers of the organisms producing the change. The bacteria which utilize nitrate oxygen and reduce the nitrogen increase in numbers in all parts except the sludge.

[Reproduced from the *American Journal of Public Health.*]

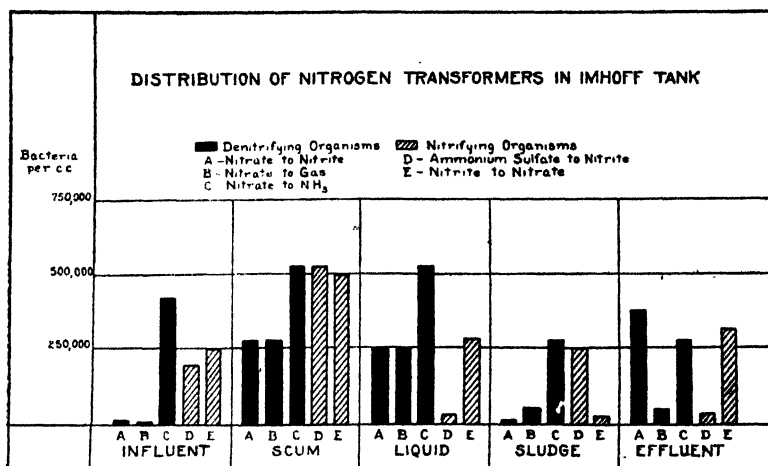


CHART II

FIG. 15.—Shows stages of denitrification and of nitrification.

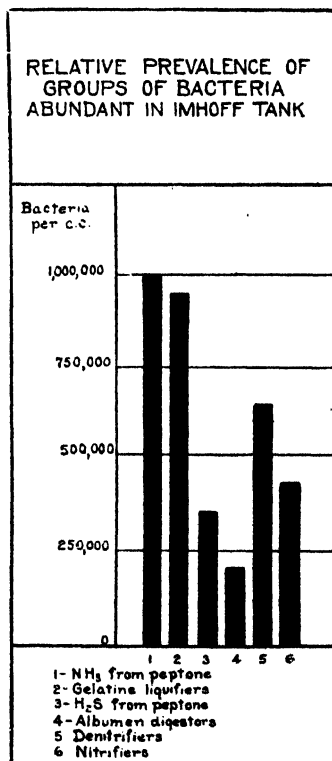


CHART III.

FIG. 16.—Relative prevalence of the various groups of bacteria in the Imhoff Tank.

[Reproduced from the *American Journal of Public Health*.]

too condensed to summarize. The bacteria found are classified as follows :

“ The bacteria through whose agency some of the enzymes are produced may be divided by their physiological activity into several groups. The bacteria which were present in high dilutions of the samples, and so were considered to be abundant in the tanks, may be divided into six groups. Of these groups of bacteria those concerned with protein digestion were : (1) the bacteria which were able to attack such a complex protein as coagulated egg albumen and produce soluble compounds, (2) those which attacked a less complex protein, such as gelatine, and caused liquefaction, (3) those which attacked a soluble protein, such as peptone, and decomposed it with the production of ammonia, (4) and those bacteria which also gave sulfides as a product of proteolysis.

“ The fifth and sixth groups are concerned with the transformation of nitrogen. There were found to be present in the tanks both those types of organisms classed as ‘ denitrifiers ’ and those termed ‘ nitrifiers.’ The former group consists of the bacteria which reduce nitrate nitrogen to nitrite and to nitrogen gas or to ammonia. The second group are the bacteria which produce nitrite nitrogen from ammonium salts and the co-operating bacteria which change the nitrite to the nitrate form.

“ In addition to these six dominant groups there have been found four groups which consist of bacteria active in the Imhoff tank but seemingly present in smaller numbers. These bacteria may be listed as : (1) the bacteria producing sulfate and free sulfur (from thiosulfate), (2) the bacteria producing hydrogen sulfide from sulfates, (3) the cellulose digesting bacteria, (4) the bacteria which split fats.”

Probably the best method of epitomizing the paper is to reproduce the charts ; these give the results in graphic form.

HAUSMAN (Leon Augustus). **Preliminary Studies of the Fauna of the Imhoff Tank.**—*Amer. J. Public Health.* 1923. Aug. Vol. 13. No. 8. pp. 656-658. With 4 figs. [1 ref.]

The writer has made a careful study of the various protozoa and other minute forms of animal life in various parts of the Imhoff Tank, and gives here the preliminary results of his observations. The object of the enquiry is to obtain answers to the following questions :

(1) The organisms present ; (2) their distribution ; (3) their effect upon the material where they occur ; (4) whether this effect is of such a character as to warrant attempts to modify their numbers ; and (5) if so, and if it be worth the cost, how this can be done ; (6) or whether the organisms present are an indifferent element in the operation of the tank, merely rising and falling in numbers in correspondence with the food supply ?

The first two questions are practically answered and the results are given in graphic form.

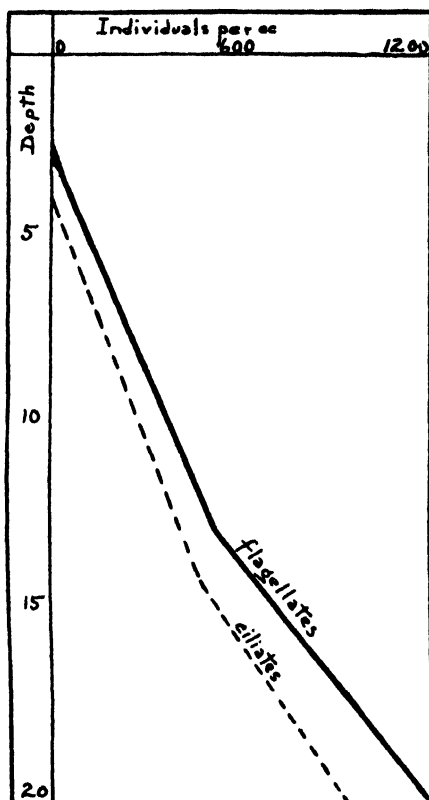


FIG. 17.—Depth succession of the dominant protozoa of the Imhoff Tank in numbers of individuals per cc.

[Reproduced from the *American Journal of Public Health*.]

WILLE (W. A.). **De septic tanks van Soerabaja en Semarang.**—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1923. Vol. 63. No. 4. pp. 663–669. With 5 text figures.

Wille describes two common mistakes made at Sourabaya and Semarang in the construction of septic tanks.

1st. The depth of the tank is often not sufficient to allow for a liquid layer between the sediment and the floating faeces. This results in choking of the outlet. The depth of the tank should be 125–290 cm. reckoned from the surface of the contents.

2nd. Wille asserts that a separation screen reaching down from the roof of the tank near the inlet confines the activities of the tank to the part in front of the screen. This last assertion appears subject to considerable doubt\*.

[This statement is only correct if the partition is successful in keeping all the solid faeces in the first chamber. If solid matter passes into the body of the Tank it naturally has no influence in this respect.—W. W. C.]

\* Summarized by Dr. W. J. BAIS.

**FULLER (George W.).** *Observations on Refuse Disposal in Europe.—*  
*Surveyor & Municipal & County Engineer.* 1923. Oct. 26.  
 Vol. 64. No. 1658. pp. 303-304. [1 ref.]

### British Refuse.—

"British refuse, as in all countries, varies considerably, depending chiefly upon the different uses of coal. A representative analysis, as estimated by Mr. DAWES, is: For ash and fine dust, 45 per cent.; cinders of all sizes, 35-40 per cent.; vegetable matter, 5-10 per cent.; paper and light debris, 4 per cent.; metals, 1-15 per cent.; bone, 3 per cent.; and glass, brick and heavy debris, 12 per cent. The British collect mixed refuse and do not deal separately with organic matter, except as it comes direct from markets. They do not use the American expression of 'garbage' as applied to kitchen refuse other than from ranges, but speak of vegetable matter, or putrescible matter, or organic matter.

### "Six British Disposal Methods.

"There are six methods in quite general use for the disposal of the mixed refuse of Great Britain:—

"1. Tipping or dumping on land where the management is inadequate for securing freedom uniformly from flies, rats, wind-blown papers or objectional smells, especially from fires which, on account of the large quantity of combustible material in the refuse, sometimes burn for months, in spite of efforts to extinguish them.

"2. Tipping or dumping on land, in conformity with precautions set forth by the Ministry of Health in its Circular of July 26th, 1922.

"3. Dumping at sea where the barging distance is reasonably short to locations where suitable tides and currents convey the material seaward and not landward. It is understood that this is practised only at Southampton and a few northerly cities on the East Coast.

"4. Burning in high temperature incinerators which the British call 'destructors,' notwithstanding that the burnt refuse leaves perhaps half of its bulk as clinker. In some, but not all, places this may be readily disposed of after crushing and screening for use in road building or for making concrete, or in some places for brickmaking. Electric current generated at destructors now finds a market through charging the batteries of motor vehicles used in collecting the refuse.

"5. Separation from the refuse of the fine dust and ashes by means of revolving screens, and also of the coarser debris, thus leaving the cinders and vegetable matter, which are incinerated. This arrangement will be carried out at the new Brook Vale destructor, now approaching completion, at Birmingham.

"6. Crushing of the mixed refuse, after freeing it of coarse debris, and utilising the pulverised product as a fertiliser for clay or loam lands. This product is also well suited for filling low lands. The fine material screened from cinders in Method 5 is similarly handled, while in Scotland much refuse is sent to farmers with little or no use of mechanical appliances for its preparation . . . .

### "Birmingham's New Plant.

"At the new 200-ton Brook Vale destructor at Birmingham, Mr. JACKSON will first remove by screening the ash and dust which form about 40 per cent. of the total refuse. This he will dispose of to farmers whom he expects to pay several shillings per ton . . . .

"The refuse is tipped into one of three 10 ton concrete hoppers, with sides having steep slopes, and at the bottom is a moving metal belt, like a stoker grate, for discharging on to a revolving screen. It is the

intention to have not more than ten shovelsful at a time on an inclined screen, say, 4 ft. in diameter and 10 ft. long, with  $\frac{3}{8}$  in. openings. The removed ash and dust goes to motor trucks or canal barges, leaving the cinder which at some places, has 10,000 B.T.U. per lb. At the lower end of each screen are several magnets for removing metals from the screened refuse before its discharge on to a moving sorting belt for hand removal of glass, bones, and heavy debris. The top of this belt passes under a hood where it is expected to remove paper by suction. The cells will be hand stoked from the top with material discharged from the sorting belt or from a tip which may be used if it is not desired to screen some portions of the refuse. Clinker will be removed from the rear of the cells."

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1923. Sept. 28.  
Vol. 64. No. 1654. p. 242. With 2 text figs.—**The S.D. Freighter Dust Cart.**

The two pictures published below give some idea of an extremely interesting and satisfactory rubbish lorry. It is specially designed for

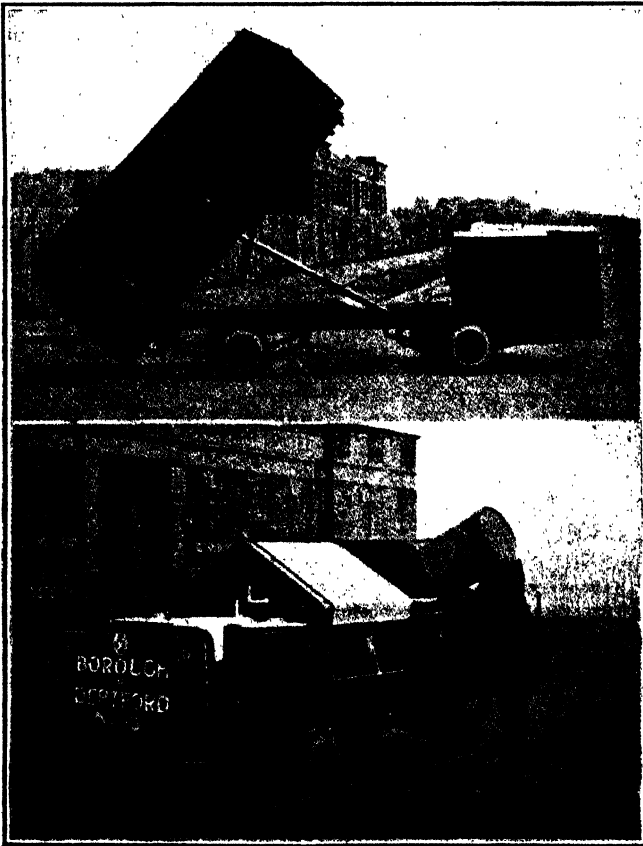


FIG. 18.—Borough of Deptford's S.D. freighter tip wagon.  
[Reproduced from *The Surveyor & Municipal & County Engineer*.]

this purpose and can be tipped up. A good point is that bins can be emptied into the receptacle without the use of a ladder. In Deptford, where this one was used, 13 to 15 hundred tons of material was handled per month. It is driven by a petrol engine and gives, loaded, 15 miles to a gallon of petrol. Its turning radius is 10 ft. 6 ins. on the outside wheels of the chassis, and outside the body 13 ft. 6 ins., so that it is admirably suited for narrow streets and conservancy lanes.

There should be a good market for vehicles of this kind in the large cities in the East.

HOWARD-JONES (J.). **The Collection and Disposal of Refuse from Ships in Docks and Harbours.**—*Jl. Roy. Sanitary Institute.* 1924. Jan. Vol. 44. No. 8. pp. 289-291.

The writer points out that in the matter of removal of refuse from ships in harbours, the arrangements still leave much to be desired. The sailor is in the habit of throwing everything unwanted overboard and does not care very much what he does with it when in port. The writer suggests that the food waste should be sent ashore as being of considerable value for feeding pigs. He describes the various method of removal such as by carts and by hoppers. He considers that arrangements for this very important branch of conservancy should be greatly improved by all harbour authorities.

JOLLY (G. G.). **An Automatic Fly Proof Latrine Seat.**—*Indian Med. Gaz.* 1923. Dec. Vol. 58. No. 12. pp. 575-578. With 5 figs.

The writer has had a very wide experience of fly-proof latrines and anti-fly measures generally; one of the results of this is the ingenious invention of which figures are here reproduced, designed as an improvement on Major SCROGGIE'S pattern (see *Tropical Diseases Bulletin*, 1920. Vol. 15. pp. 370-371). The important points are as follows:

" 1. The shutters, being arranged to slide horizontally under the right and left halves of the top, are never in such a position that they can be fouled, since they completely disappear from sight as soon as the individual steps on the seat, and remain thus until he steps off again.

" 2. The arrangement of the oval pan receptacle is such that its top edge comes close up to the under surface of the shutters, so that there is no possibility of excreta going anywhere than into it. The pan is ordinarily designed to take both faeces and urine, but it can be constructed in two sections so that they may be separated.

" 3. In the portable pattern, entirely constructed of iron and steel, the weight of the whole seat is approximately 40 lbs., and handles are provided on either side to admit of its being readily moved from place to place.

" 4. In the fixed pattern the top is constructed so that it can be lifted clear of the cement base, bringing with it the whole of the working parts, a procedure which facilitates repair and renewals.

" 5. The working parts are simple, and so designed that they can be readily replaced or renewed by an ordinary blacksmith.

" 6. The only attention which the seat requires beyond the periodical removal of the pan for emptying and cleaning, is an occasional application of cart grease to the working parts."



Illustrating JOLLY, G. G.]

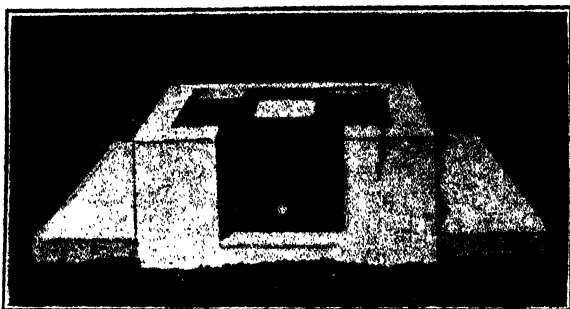


FIG. 19.—Front view, closed.

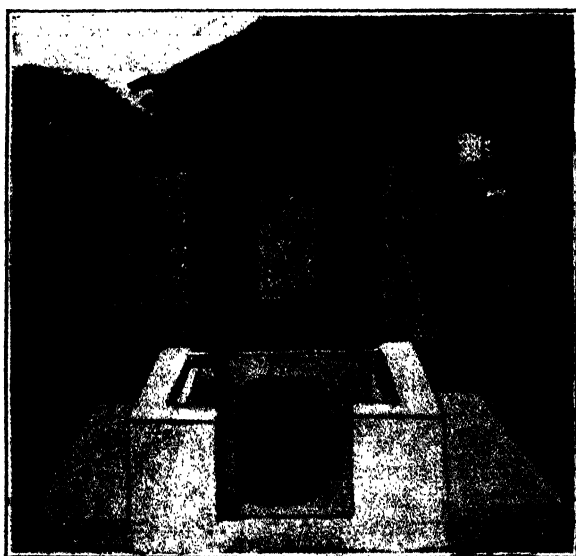


FIG. 20.—Front view, top raised.

Automatic fly-proof latrine seat.

[Reproduced from the *Indian Medical Gazette*.]

Illustrating JOLLY, G. G.]

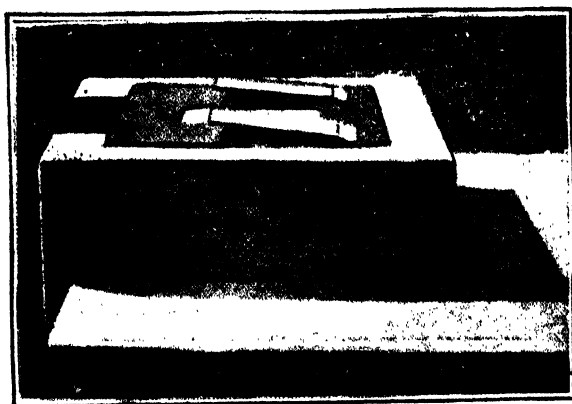


FIG. 21.—Side view, closed.

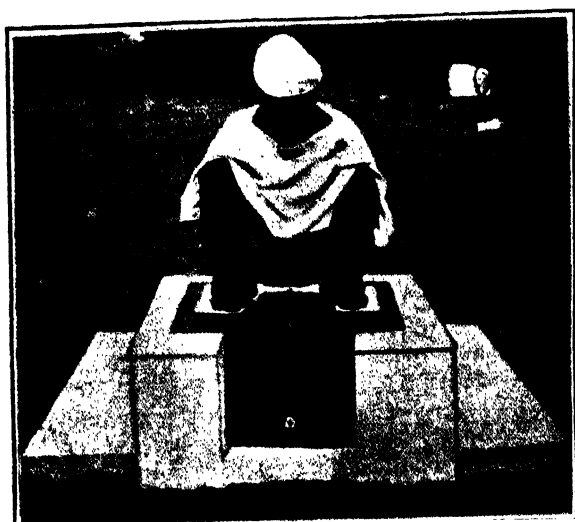


FIG. 22.—Front view, in use.

Automatic fly-proof latrine seat.

[Reproduced from the *Indian Medical Gazette*.]

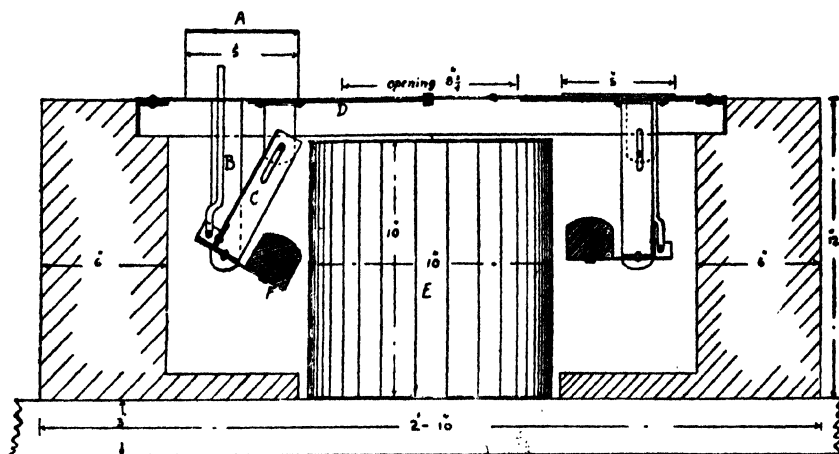


FIG. 23.—Cross Section of automatic fly-proof latrine seat. Foot plate A presses down rod B. Crank C then pulls shutter D and exposes receptacle E. Return action is made by weight F when foot is taken off A.

[Reproduced from the *Indian Medical Gazette*.]

### SMALLPOX VACCINATION.

GRUBBS (S. B.). **Vaccination Technique and Certification. An Experiment in making Vaccination an Insurance against Delay as well as a Protection against Disease.**—*Public Health Rep.* 1923. Sept. 21. Vol. 38. No. 38. pp. 2201-2206.

The writer gives an account of the lines on which smallpox vaccination is carried out in the New York quarantine stations. He points out that "with standard technique and proper virus, it is possible with this reaction to read the degree of immunity to smallpox possessed by the individual vaccinated . . . . The local disturbance or reaction following vaccination may appear within a few hours or not for several days. In general terms, the time of its appearance measures the person's resistance to smallpox, *i.e.* the earlier the reaction the greater the immunity; the later the reaction the less the immunity. The early reactions are, as a rule, slight, and the later reactions are more severe. Thus, persons previously unvaccinated will usually show no disturbances for three days or even longer, but the reaction will then go to a successful take. For purposes of record, three degrees of reaction are recognized; namely, immune reaction, vaccinoid, and successful vaccination; and further sub-divisions, especially of the immune reaction, may be recorded, if desired, by a system of plus marks. No hard and fast line can be drawn, however, although we usually say that an immune reaction must appear before 48 hours."

Certificates are granted the immune in the form of cards, a sample of which is given, and it is hoped that this will be recognized throughout the whole of the United States.

"We are confident that whenever such contacts show an immune reaction within 48 hours (at least two plus) they will not contract the disease and, therefore, may be released. If the reaction occurs after 48 hours, however, it shows the immunity is not complete and that smallpox may develop, probably in a mild form but dangerous to others. These persons must be held 10 days after vaccination. Full 14 days are not required, as, at the end of 10 days, after vaccination giving a reaction, there will be sufficient immunity from the vaccination just done to prevent the development of smallpox."

A description of the method used is as follows.—The skin is sterilized in the ordinary way and three scratches  $\frac{3}{4}$  in. long and an inch apart are made on the arm with a sterile needle. When the "drill method" is used three small holes two millimetres in width and an inch apart are substituted for the scratches. The standard virus is rubbed into the two outer lines with a sterile tooth pick. The advantage of this is that you have a control incision which is useful in ascertaining the amount of reaction. The immune reaction is described as follows.

"There is redness and swelling along the lines of incision which has received the vaccine as compared with the control. Vesicles rarely occur. The reactions may be divided into four grades as indicated by "+, "+ +, "+ + +, and "+ + + +."

"+" Reaction—One in which there is slightly more swelling and redness in the vaccination scratch than in the control.

"++" Reaction—A definite reaction as compared with control.

"+++" Reaction—Marked reaction as compared with control.

"++++" Reaction—Very well marked reaction as compared with control.

"Reactions which do not make their first appearance within 48 hours will not be classed as immune reactions for the purpose of releasing persons from quarantine detention or for other purposes, nor will a "+" reaction be accepted either for release or issue of certificate. Reactions must be definite . . . . ."

"*Vaccinoid* (accelerated and modified vaccination).—Appears after 48 hours. The papule occurs after two but frequently before 5 days have elapsed. The reaction is less severe and takes less time to run its course than a typical take. Vesicles frequent; pustules not always present.

"Successful vaccination.—(Typical Jennerian vaccinia).—No reaction shown for three to five days. Vesiculation from fifth to seventh day with areola present; purulent, with well-marked areola about the eighth day."

LEAKE (J. P.). *The Immunity following Smallpox Vaccination.*—*Milit. Surgeon.* 1923. Oct. Vol. 53. No. 4. pp. 328-336. [12 refs.]

This paper covers much the same ground as the one preceding. The author describes in detail the manifestations of vaccinia in the unvaccinated and in the person with a considerable amount of immunity. He prefers the small cutting drill 2 mm. in width to the needle and recommends that control sites not inoculated with lymph should be made when dealing with the slight reactions of high immunity.

He goes on to quote some figures of GINS of Berlin, who makes use of the "green" or unsterilized virus, and points out that although

re-vaccination may be classed as "unsuccessful" it increases the resistance of the patient. He points out also that when immediate danger of smallpox is present and high immunity is required quickly it is better to make a large number of small points than one or two large areas of scarification. These are more liable to septic infection and do not heal so quickly. He considers that vaccination, like oil in a good machine, should be applied little but often. The writer describes the various methods of storing vaccine lymph at low temperature.

It is well known that immunity to naturally acquired smallpox is generally higher than immunity to vaccination. In support of this he quotes an outbreak in a Burmese village. The population was about 1,500, of whom 144 had been successfully vaccinated within the preceding two years; 123 of the latter were inoculated, by an "inoculator," with smallpox during the epidemic without result. None of the other 21 vaccinated persons suffered from smallpox.

The writer also points out a fact well known to medical officers in the Tropics that the immunity which would be quite sufficient to protect an individual against chance exposure in a well-vaccinated community is inadequate in a poorly vaccinated place where the exposure may be intense and continual. Thus vaccinated persons have been known to contract smallpox and die from the haemorrhagic form.

## CHILD WELFARE.

**BRAZIL. Departamento da Creança no Brasil. Rapida noticia sobre o Instituto de Protecção e Assistencia á Infancia do Rio de Janeiro. Seus serviços prestados ao paiz.** [Child Welfare in Brazil].—1923. (Boletim de Julho). 13 pp.

The work which has been undertaken by the Institute for Child Welfare (O Instituto de Protecção e Assistencia á Infancia) since coming into existence in July 1914 is very extensive. Over 100,000 poor families, comprising more than 410,000 individuals, have received assistance. In 1904 the Federal Government contributed 6,000 dollars, which was subsequently increased to 68,000 dollars. In 1906 the Municipal authorities gave another 6,000 and now contribute 36,000 dollars annually.

The activities of the Institute are many and there are sections dealing with every branch of the subject including even playgrounds and schools. At the Dispensaries, besides the usual medical and surgical treatment, there are available massage, electrotherapy, heliotherapy, and so forth. Arrangements are made for vaccination and re-vaccination, for distribution of food and clothing to the indigent and for the supply of suitable nurses. No statements as to the results of the working of the individual sections, nor as to the influence on the infantile mortality rate are given.

The Institute originally limited its activities to Rio de Janeiro, but now has branches in 17 districts of Brazil.\*

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\* Summarized by Dr. H. Harold Scott.

VARIOT (G.). **Les gouttes de lait dans les pays chauds. Utilisation de laits condensés sucrés.**—*Rev. Prat. Malad. des Pays Chauds.* Paris. 1923. Aug.-Sept. 2nd Year. Vol. 3. pp. 34-41. [2 refs.]

The writer gives a very interesting account of the method of administering child welfare depots in the French Colonies. He inspected one of the best established of these in Algeria and Tunis. They are now established in Casablanca, Rabat, Marrakech and Fez, in Dakar in W. Africa, Tonkin in E. Indies and in Madagascar.

In many parts of the tropics there are practically no cows ; in others the milk obtainable is of poor quality and scarce. The author has had considerable experience of ordinary sugared condensed milk, particularly the Gallia brand ; this is made in France, is not heated above 108° C. and is packed in sterile bottles and carefully corked. After 5 or 6 months it produces slight scorbutic effects ; consequently orange juice must be added to the diet. The drawback is the fragility of the bottles, which require very careful packing in properly prepared crates such as are used for bottles of wine.

Recently it has been found that the ordinary condensed milk with about 10 per cent. of saccharose added to it, provided it is evaporated down at a temperature of 60° C. only and packed in tins, is actually more satisfactory than the bottled product. The advantages of the tin over the bottle for export work are obvious. The 10 per cent. of sugar added is absorbed by the infant and apparently does not produce any ill results.

After very long experience of the use of this kind of milk the writer considers it to be of very great help in reducing infant mortality amongst children that cannot be fed at the breast.

WORLD'S HEALTH. Paris. 1923. Aug. Vol. 4. No. 8. pp. 20-23. With 2 figs.—**Sidelights on Child Welfare in India.**

This is an interesting popular account of the various difficulties met with by nurses and medical officers in charge of maternity and child welfare centres in India,—difficulties well known to our readers.

## INDUSTRIAL HYGIENE.

COMMONWEALTH OF AUSTRALIA. Department of Health. Service Publication No. 26. 1923. 14 pp. With 1 plate.—**Hygienic Aspects of Factories and Shops Acts.**

This is a constructive criticism of the Factory and Shops Acts of Australia. It deals with all aspects of the Acts, such as accidents, inspection, employment of children, young persons and women, factory hours, hygienic conditions (ventilation, dangerous dusts, illumination, etc.) and general sanitation. Among items of general interest outside Australia there is a drawing of the ideal working chair for factories from a model devised by a committee of surgeons in Boston ; it is made in 4 sizes, 17, 18, 19 and 20 ins.

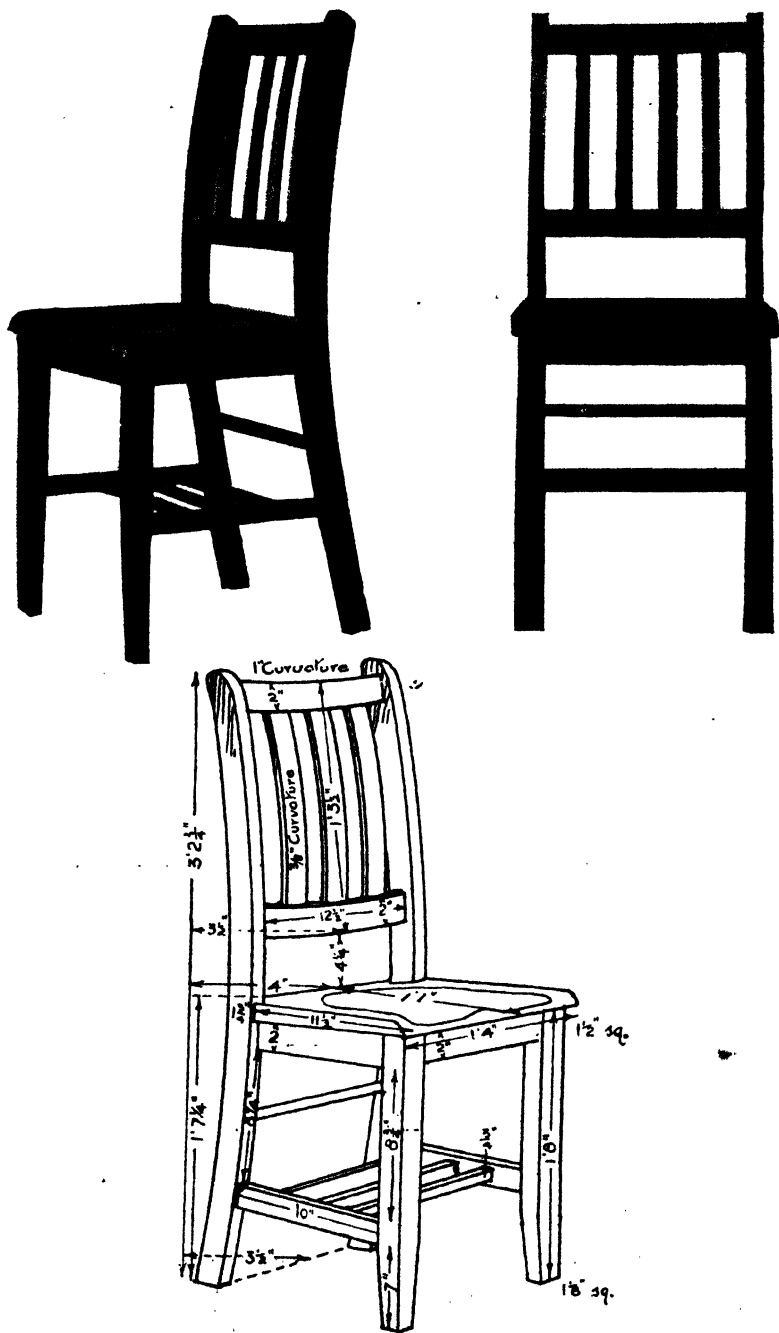


FIG. 24.—Illustration of a work chair, specimens of which were made for the Commonwealth Department of Health. The chair is made on the lines of the model chair devised by a committee of which Dr. J. E. Goldthwait, an orthopaedic surgeon of Boston, was chairman, and described in the *Journal of Industrial Hygiene* for September, 1921.

[Reproduced from *Commonwealth of Australia. Dept. of Health. Service Publication No. 26.*]

## REPORTS AND VITAL STATISTICS.

UGANDA PROTECTORATE. **Annual Medical and Sanitary Report for the Year ended December 31st, 1922.** [REFORD (J. Hope). Acting Principal Medical Officer.]—71 pp. 1923. Entebbe; Government Printer.

Birth rate 23·5 per thousand.

Death rate 20·8 per thousand.

Still-birth rate is high, namely, 12·79 per cent. of total births.

Considerable reduction in plague, smallpox and cerebro-spinal disease is reported from townships. 6 out of 7 cases of plague were treated with intravenous injections of salvarsan and recovered. Tick fever is very prevalent in the Western Province. Leprosy appears to be on the increase.

GAMBIA. **The Annual Medical and Sanitary Report for the Year 1922.** [ALLAN (K. V.), Senior Medical Officer].—39 pp. With 6 charts. London: Crown Agents for the Colonies, 4, Millbank, S.W.1. [Price 5s.]

Causes of infant mortality.—

- (1) Tetanus 26 per cent. of deaths.
- (2) Exhaustion from diarrhoea due to fly infection of food.
- (3) Fatal convulsions, very likely due to malaria.
- (4) Poor housing on damp sites in neglected parts of the town.
- (5) Illegitimacy.

CULLEN (J. P.). **Medical and Sanitary Work with the Burma Corporation.**—*Lancet*. 1923. Dec. 29. pp. 1426-1427.

This article is a review of the report of the Chief Medical Officer of the Burma Corporation, which operates in the North Shan state of Burma, about 600 miles north of Rangoon, with headquarters at Namtu at an altitude of 750 ft. The second centre, Bawdwin, is at a greater altitude. The Corporation is responsible for the medical care of a population of about 20,000, including Europeans and natives of all descriptions.

The general hygiene arrangements are good. The bungalows are made of wood and are properly screened against mosquitoes, electric light and water are laid on, and a water-borne system of sewage provided, with a small septic tank. The native accommodation consists of wood or mat houses with the ordinary pail system of conservancy. There is a large hospital and also an infectious diseases section.

Regarding enteric fever as a satisfactory index of the sanitation, it may be stated the neither enteric or cholera has appeared. A few cases of plague have occurred, but none of smallpox during the last three years.

There were in 1922 more than 17,000 cases of malaria in the hospital and dispensary, with 100 deaths, a mortality of about 15 per cent. Amongst 22 European cases no deaths occurred. A case of blackwater fever was noted in a native. A few cases of relapsing fever occurred, mostly amongst Chinese from Yunnan, with one death. An outbreak of beriberi with 19 deaths was caused by a few Chinese labourers arranging to mess with another Chinaman who fed them entirely on polished rice. There were no cases of miners' phthisis in the mines.



There is little or no hookworm disease, only 2 cases being discovered in the course of 1922. A certain amount of lead poisoning occurred amongst the smelters, due to the insufficient ventilation in the neighbourhood of the furnaces; this has now been remedied. The general crude death rate of 20,000 population is estimated at 17·5, malaria at 5 per thousand, and dysentery 75 per thousand.

**STRAITS SETTLEMENTS. Annual Report on the Medical Department for the Year 1922.** [HOOPS (A. L.), Principal Civil Medical Officer.]—96 pp. 1923. Singapore: Govt. Printing Office.

Some interesting figures from the hospital, Tan Tock Seng, Singapore, are quoted below.

<i>Malaria.</i>					<i>Cases treated.</i>	<i>Deaths.</i>
Benign Tertian	...	...	...	...	286	9
Malignant Tertian	...	...	...	...	725	102
Quartan	...	...	...	...	172	5
Mixed	...	...	...	...	71	3
Chronic	...	...	...	...	402	43
Unclassified	...	...	...	...	164	6
Total					1,820	168
<i>Dysentery.</i>						
Amoebic	...	...	...	...	282	178
Bacillary	...	...	...	...	157	117
Unclassified	...	...	...	...	88	8
<i>* Helminthiasis</i>						<i>Cases.</i>
Ankylostoma ova	...	...	...	...	...	454
Ankylostoma ova + Roundworm	...	...	...	...	...	110
Ankylostoma ova + Whipworm	...	...	...	...	...	98
Round worm only	...	...	...	...	...	252
Ankylostoma ova + Roundworm and Whipworm	...	...	...	...	...	66
Roundworm and Whipworm	...	...	...	...	...	112
Whipworm only	...	...	...	...	...	278
Negative	...	...	...	...	...	2,168
Total						3,538

\*Stools of every patient examined.

**BOMBAY. Fifty-ninth Annual Report of the Director of Public Health for the Government of Bombay, 1922, with Appendices, including the Annual Report of the Sanitary Board, Bombay Presidency, and the Annual Reports of the Health Officers of the Ports of Bombay, Karachi, and Aden.** [MELHUISE (H.), Acting Director of Public Health.]—pp. ii + 40 + 57. With 9 charts. 1923. Bombay: Govt. Central Press. [Price Re. 1 As. 5.]

Charts showing the monthly incidence of deaths from plague, cholera and smallpox in the Bombay Presidency during 1922, compared with the monthly incidence in 1921 and with the decennial means for the period 1911-1920 are reproduced (Fig. 25).

3

## MONTHLY INCIDENCE OF DEATHS FROM EPIDEMIC DISEASES.

1922 —●—, 1921 —○—, 1911-20 mean: - - - -

Semi-Log: Scales = deaths in thousands.

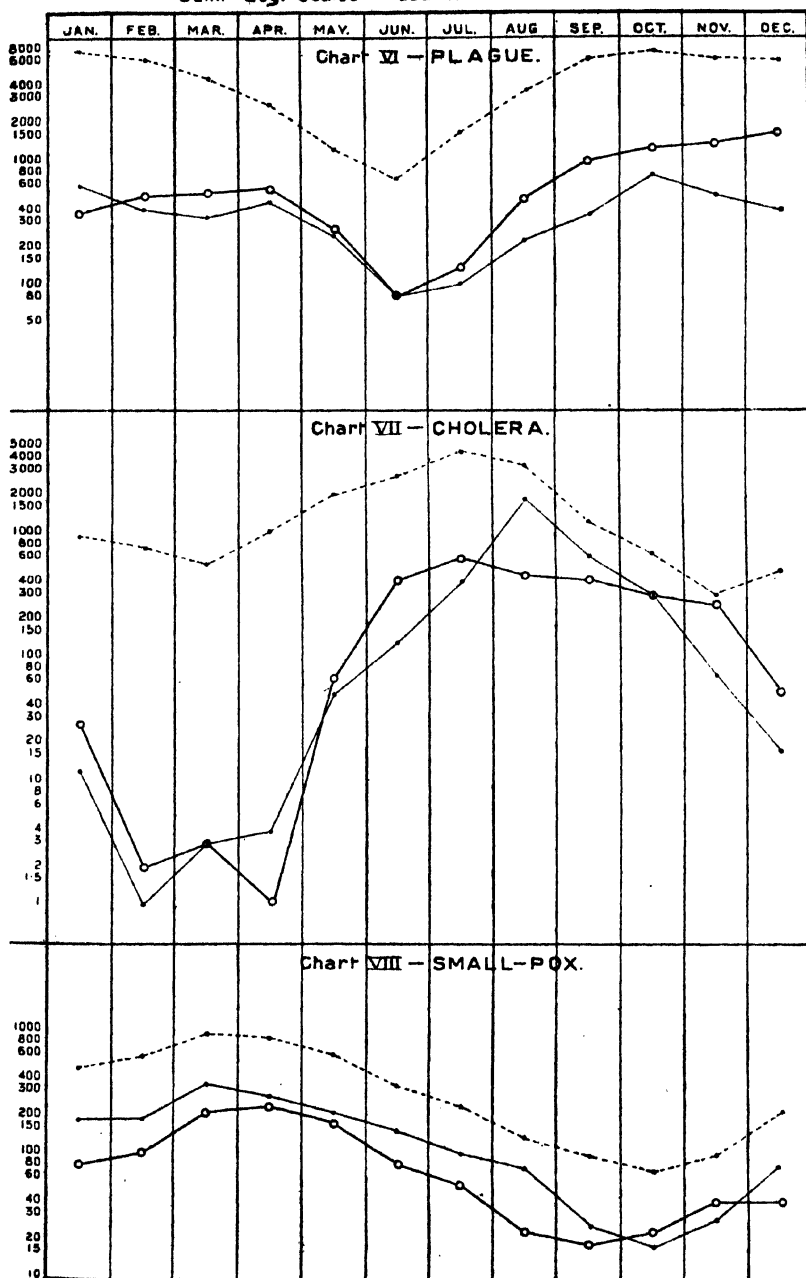


FIG. 25.—Monthly incidence of deaths from plague, cholera and smallpox in the Bombay Presidency in 1922 and earlier years.

[Reproduced from the 59th Annual Report of the Director of Public Health for the Government of Bombay, 1922.]

**TIETZE (S.). Sanitary Progress in the Philippine Islands during 1922.—**  
*Monthly Bull. Philippine Health Service.* 1923. Jan. Vol. 3.  
 No. 1. pp. 3-19.

"Substantial decrements in the general mortality and in infant mortality rates constituted the salient gains of the year. The work in leprosy investigation has been expanded by more liberal appropriations and the detailing of expert technical personnel at Culion and San Lazaro Hospital; the vaccination campaigns for the eradication of smallpox, cholera, and typhoid fever have been conducted and continued in an intensive and systematic manner; and with the co-operation of the Rockefeller Foundation, malaria and hookworm surveys were effected."

**NORTHERN TERRITORY OF AUSTRALIA. Report on the Health Department for Year ending 30th June, 1921.** [JONES (H. Leighton), Chief Health Officer.]—*Report of Administrator for the Year ended 30th June, 1921.* pp. 27-32.

This report deals with a very small population, namely, 3,572, 2,478 being Europeans and 1,094 coloured races. This gives some idea of the very sparse population of the Northern Territory of Australia.

During the year there were no cases of enteric and no influenza. There was a mild epidemic of dengue, three cases of diphtheria and some malignant malaria in the latter part of the year.

There are about 13 lepers in the Leper Asylum.

The M.O. in charge considers the arrangements are not satisfactory as regards water supply, and makes recommendations accordingly. Of ankylostomiasis there is very little. Amongst so scattered a population as this anti-malarial measures largely consist of adequate treatment of the infected people. Measures taken in the town of Darwin follow the usual lines.

The following description of the Chinatown in Darwin is given.

"1. All the coloured people now housed in the Police paddock, together with those consumptive, and others who were repatriated to China at the expense of the Government, were located in the most congested parts of Chinatown, Darwin, as many as 32 families being camped on one half-acre. See Dr. Holmes photographs, Annual report, 1913.

"2. Infectious disease was rife amongst them.

"3. The water supplies from shallow wells were so polluted that many wells had to be closed and kept closed for a considerable time.

"4. A very high infantile death rate.

"Under new conditions in the Police paddock:—

"1. The village is situated nearly two miles from the town of Darwin proper.

"2. Fifty-six houses and camps on 56  $\frac{1}{2}$ -acre allotments.

"3. Three houses on three  $\frac{1}{2}$ -acre allotments.

"4. No infantile death rate.

"5. Good safe water supply from a sub-artesian bore, the expense of which was borne by the Government.

"6. The much improved condition of the coloured children.

"7. The fact that in any outbreak of infectious disease the coloured people can be confined to the Police paddock."

Crude European death rate, 11.5 per thousand.

Coloured death rate 24.6 per thousand.

European birth rate 10.08 per thousand.

Coloured birth rate 22.8 per thousand.

NEW ZEALAND. Department of Health. **Report of the Director-General of Health, New Zealand, for the Year ended 31st March, 1923.** [VALENTINE (T. H. A.) Director-General of Health.]—51 pp. With 4 graphs. 1923. Wellington: By Authority: W. A. G. Skinner, Government Printer.

Although by no stretch of imagination can the country of New Zealand be said to be the home of tropical disease, the annual report of the Department of Health contains some very interesting matter.

The mean population for 1922 was 1,251,895 (exclusive of Maoris), an increase of 27,994 over the previous year. The Maori population of the previous year was 52,751.

Birth rate 23·17 per 1,000. Crude death rate, 8·77 per 1,000 of mean population; standardised death rate, 10·70. Infant mortality in 1922 was 41·9 per 1,000 births, the lowest rate on record.

*Death rates of Notifiable diseases in 1922.* Scarlet fever, 0·08 per 10,000 of the population, has declined very rapidly since 1918. Diphtheria, 0·62 per 10,000 of the population, has also steadily decreased. Enteric fever, 0·54 per 10,000 of the population, shows a considerable increase owing to a water borne epidemic in Auckland. Tuberculosis, 6·56 per 10,000 of the population; of the total of 821 deaths 626 were assigned to pulmonary tuberculosis. Puerperal septicaemia, 1·79 per 1,000 births; the notifications have steadily increased during the last 5 years, but this is held to be attributable to more general observance of the law relating to notification, though it is admitted "that New Zealand occupies an unfavourable position as regards this disease in comparison with other countries." Influenza, a low incidence and a general mild type prevailed (23 deaths).

An interesting account of a water borne outbreak of enteric fever is recorded. It occurred in Mount Albert, a suburb of Auckland, also in the Avondale Asylum, which is in the same water supply area.

The water comes from a spring and is tapped by a well which passes through beds of very porous volcanic scoriae; it is pumped into reservoirs, and originally was extremely pure bacteriologically and chemically. During the last 12 years about a thousand houses have been built within what is probably the catchment area of the spring, and the sewage of some of them passes into the extremely porous soil. Early in 1921 the water, though still chemically quite pure, gave (on agar at 37°C.) 24 colonies of *Bacillus coli* in 5 cc. In November 1921 coli were present in 0·1 cc. of the water and the colonies on gelatine had run up to 127 per cc. Chlorination of the water was immediately started and a standard of purity obtained (no coli in less than 50 cc.). Then the ratepayers complained and the quantity of chlorine was reduced; and an abnormally heavy rainfall during the month of March undoubtedly led to more pollution through the very porous soil. In April coli were present in '01 cc. and cases of enteric had already been reported by that date. On April 13th use of the water was discontinued, the reservoirs were chlorinated and the dead ends flushed, and water from the town mains was taken into use. This undoubtedly cut short the epidemic. The number of cases reported during the epidemic, week by week, from the first week, beginning 3rd April, to the last week, ending 30th June, was 1, 23, 59, 35, 17, 11, 5, 0, 4, 0, 0, 1, 0, a total of 156 cases, in addition to 60 cases in the Asylum.

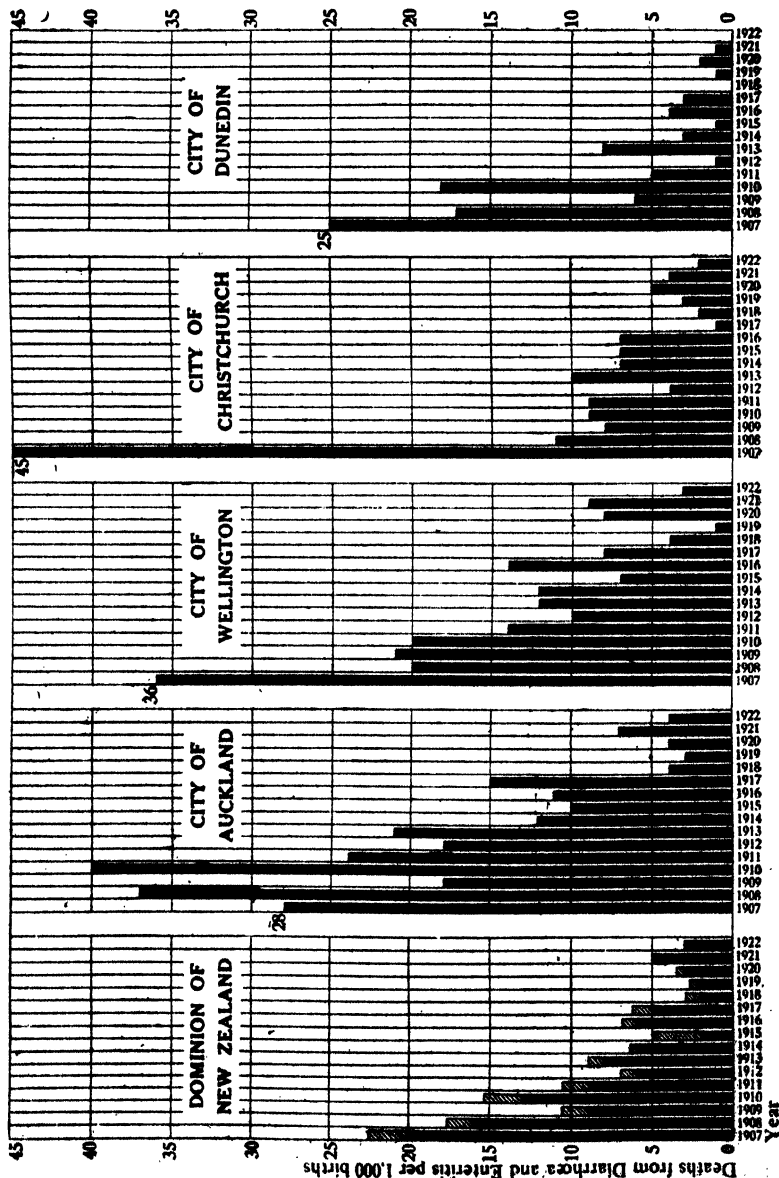
The population of Auckland is 157,000; 11,300 persons live within the area supplied by Mount Albert spring; amongst these 195 cases

[Reproduced from the Report of the Director-General of Health, New Zealand, for the year ended 31st March, 1923.]

FIG. 26—Annual mortality-rates from gastro-enteritis and diarrhoea per thousand births, 1907–1922.

(1) *For the Dominion of New Zealand.*—(a) The lower, solid, black columns show the deaths from diarrhoea in the first year of life; (b) the hatched part above shows the deaths in the second year of life; (c) the total height of each combined column shows the rate for the first two years of life.

(2) *For the Cities.*—The columns all show the death-rates from diarrhoea for the first two years of life, and therefore they correspond to the combined columns as given for the Dominion.



of typhoid appeared between April 7 and May 20th. In the 145,700 persons living outside the area 38 cases of typhoid had been reported. Of these 15 were amongst persons who, like the Point Chevalier school children, were known to be exposed to chance infection from the Mount Albert water supply. Government bacteriologists point out that true typhoids and paratyphoid A and B were all present.

The report also gives some extremely interesting figures on the Child Welfare Work in New Zealand. The accompanying chart gives the gastro-enteritis and diarrhoea mortality rates per thousand births.

**SNYDER (J. J.). A Report on the Sanitary Conditions of the Second Brigade, United States Marines, Santo Domingo, for the Year of 1922.—U.S. Nav. Med. Bull., 1923. Aug. Vol. 19. No. 2. pp. 170–181. [1 ref.]**

The author has produced an extremely chatty and fascinating paper. He gives the history of the Colony and of practically all the diseases mentioned in the course of the paper.

The following brief summary is given in the author's own words.—

"What measures should be instituted to keep an expeditionary force fit for service in the Tropics?"

"1. Moderation in all things when possible—drills, athletics, marches, etc.

"2. Avoiding exposure combined with exertion during the heat of the day, unless unavoidable. The natives have shown that the siesta is of value.

"3. The food should be nutritious and well cooked, with an abundance of fruit.

"4. A water-boiling detail should be routine in camp or field.

"5. The insistence on the use of mosquito nets and careful nightly inspections by the sentries will show results in a low malarial incidence.

"6. Insistence on a follow-up treatment for every case of malaria, so that every known source of infection is eradicated.

"7. Co-operation between the provost marshal and the medical officers in the eradication of venereal disease.

"8. Insistence on antityphoid and cowpox vaccinations for the command.

"9. . . Homesickness is a very real disease, and . . . my belief is that it was one of the compelling reasons [of suicide] . . .

"10. That the easiest, best, and quickest method of transporting patients in a tropical country is by airplane, and future hospitals, if possible, should be located near a landing field or have a landing field of their own."

**VENEZUELAN SUN LIMITED. Medical Department. First Annual Report. Valera, Venezuela. 1922. [DE BELLARD (E. P.)]—44 pp. With 1 chart. 1923. Caracas: Tipografia Americana.**

The Venezuelan Sun Limited is mainly interested in oil concessions in Venezuela. The report shows that the Company operates in several very unhealthy places, particularly on the shores of Lake Maracaibo. The headquarters hospital is situated at Valera, 1,800 ft. above sea level with a dry, bracing air.

Malaria, chiefly benign tertian, forms a large proportion of the sickness. The writer strongly recommends in heavily infected districts a

large prophylactic dose of quinine daily, administered by a corporal or time-keeper to the labourers. The houses are screened by fine wire gauze and all rank vegetation for a considerable area is removed.

Dysentery is widely spread, one small epidemic of the vacillary variety, Flexner type, causing a few deaths, occurred during the year.

Ankylostomiasis is rampant and other helminths appear to be abundant.

The writer gives a very full and interesting account of trypanosomiasis and the reduviid carrier (*Rhodnius prolixus*, Stahl). He says that the native houses made of palm leaves are simply crawling with these animals, and it is extremely difficult to prevent bites even with properly adjusted mosquito curtains, as the insect's habits resemble those of the bed bug. A large percentage of *Rhodnius* is infected with trypanosomes, but in spite of this Chagas' disease is not very common.

An interesting account of climatic bubo is also given, its origin is discussed and the difficulties of treating it. The writer approves of excision of the glands as the best method of cure.

WOLFF (J. W.). **Geboorte, ziekte en sterfte in Suriname.** [Natality, Morbidity and Mortality in Dutch Guiana].—*Nederl. Tijdschr. v. Geneesk.* 1923. Sept. 15. Year 67. 2nd Half. No. 11. pp. 1132-1138.

The census of 31 Dec. 1922 shows the number of inhabitants of the colony to be 112,999. Of the capital Paramaribo 44,833. From 1918 till 1922 the natality was 29·1—23·6—32·7—32·9—30·0, the mortality 3·3 [? 33·0]—26·3—22·9—23·7—19·1 per mille. In Paramaribo the corrected mortality and natality were 22·5 and 26·2 per mille.

The lethality (in percentages of total number of deaths) of typhoid is 3·5 in 1921 and 1·8 in 1922.

dysentery is	5·8	„	2·0	„
anklyostomiasis is	6·9	„	4·7	„
leprosy is	1·1	„	5·9	„
tuberculosis is	8·3	„	10·8	(all forms)
cancer is	3·2	„	2·8	

3·5 per cent of the population are infected with *Schistosoma mansoni*, most of the sufferers belonging to the agricultural population. 300 lepers are treated in 3 asylums, 300-400 are free in the town and 50 more in the districts. A law is in preparation prescribing stricter measures.

50-60 per cent. of the town population is infected with *Filaria bancrofti*; special funds are available for combating *Culex fatigans*. 16·6 per cent. of the school-children in Paramaribo are affected with trachoma; in some rural districts this figure is 27 and 47 per cent.\*

ZIEMANN (H.). **Beitrag zur Bevölkerungsfrage der farbigen Rassen (Steigerung der Geburtenzahl und Verminderung der Kindersterblichkeit in den Kolonien. Ein kolonialhygienischen Programm der Vergangenheit und Zukunft).**—[The Population Problem of the Coloured Races. How to raise the Birth Rate and diminish Child Mortality in the Tropics.] *Metron.* 1923. July 1. Vol. 3. No. 1. pp. 35-109. [58 refs.]

The author calls attention to the sparse population of the former German Colonies.

\* Summarized by Dr. N. H. SWELLENGREBEL.

In Togo there were in 1911	11 persons to the square kilometer.
In East Africa „ „	6-7 persons „ „
In Cameroon „ „	5 persons „ „
In Samoa „ „	13 persons „ „
In New Guinea „ „	1-2 persons „ „
In South-West Africa „ „	1-4 persons „ „

whereas in Germany there were 120 persons to the same area. He contrasts the population of Java [265 to the square kilometer in 1920] with that of the Colonies named, and he notes that though he is not aware of any large emigration the population of [Western] Samoa, a group free from malaria, increased between 1906 and 1911 only from 33,478 to 33,554.

He considers his subject under three heads—

1. What are the reasons for the relatively small populations and the means of increasing them?

2. Special causes of the child mortality and the measures needed to prevent it.

3. Measures for increasing the birth-rate.

1. The subject is considered generally rather than territorially and the factors, taken up in turn, are the primitive forest, which mechanically checks expansion; deficiencies of clothing and of diet; lack of drinking water or its bad quality; and, amongst other decimating causes, slavery and intertribal wars (less operative now than formerly), superstitions, especially that of the causation of disease by human agency, secret murder sects, the necessity for collection of bodies of labourers for railway construction and the like, the carrier system; infectious diseases, *e.g.*, malaria, dysentery and worm diseases, smallpox, venereal disease, yaws, relapsing fever, tropical ulcer, leprosy, sleeping sickness, filarial disease, tuberculosis, alcoholism.

2. Statistics are given from the several colonies and chiefly from Cameroon and German East Africa.

In those from Cameroon attention is drawn to the number of barren women in the under-nourished coastal Kribis, in the Mwogatemenge with much venereal disease, at the military station of Soppo, and to the poor figures of the grassland where there is no malaria. In Ebolowa, according to Dr. JAGER, the causes of death among 821 children were as follows—born dead 190, unknown 177, malaria 115, intestinal diseases 110, lack of mother's milk 66, perished in war 44, yaws 31, chest diseases 15, and 6 lesser causes which do not include syphilis or small-pox.

Another table is a condensation of several pages of statistics from the *Kolonialblatt* (1914). Samples of every tribe in German East Africa were taken and the information was obtained from the natives. The net result is to show that owing to miscarriages and deaths in childhood the rate of increase is very small. In the Mojidjo district there are hardly any children; polygamy is said to be the cause, leading to prostitution and spread of venereal disease. In the Bukoba district there was one child to 2 marriages, among the Waheia one to one. In Karagwe 50 per cent. suffer from syphilis and 30 per cent. from gonorrhoea, and under-feeding is general, so that the mothers are ill-nourished, lose their milk, and give the children unsuitable food. Among the Wadschagga 50 per cent. die in the first year of life. In Kilwa 56 per cent. of children are said to die of malaria and 35 per cent. of intestinal catarrh. A leaflet on the feeding of children here was so much in demand that it had to be reprinted. The author puts in a caveat to the effect that these figures were likely taken from natives at work away from their homes and



hence out of their proper environment, which if it did not affect the birthrate would certainly influence the mortality.

The table shows that of 78,000 children born 23·1 per cent. died under one year and 18·2 per cent. in later years, leaving 58·7 per cent. living children, and that to each of 45,850 women there were 1·8 births and 1·08 surviving children. The sex proportion of the children born was 103 male : 100 female, but there are great differences in the several tribes. As he states, the figures generally must be studied for each tribe. One set of Mission statistics may be given—951 women under 40 and of an average age of 23 had 297 miscarriages, 897 children dead under one year, and 221 dead over that age, *i.e.*, 1,118 dead children; 441 children living under one year and 973 living over one year, *i.e.*, 1,414 surviving; 2,532 children in all, to each woman  $2\frac{2}{3}$ , one of whom had died. 35·4 per cent. died in infancy and 8·7 later, the total mortality being 44·1 per cent.

Into the figures for the (former) German South Sea Islands there is not space to go; the population was falling and in nearly all cases boys were in undue proportion to girls (*e.g.*, Caroline Islands, 112 : 100).

From the statistics available the author lays down certain rules for future statistical research. The figures from each colony must be made out so as to be comparable. Samples, to consist of not less than 1,000 souls, must be taken from tribes in their natural surroundings and the observation repeated if possible every year. The total population in men, women and children is required. Age is difficult to assess, but two periods are recognized by every woman—the onset of menstruation at 12–13 and the menopause at 40, the limits of the child-bearing age. The age in native men when power of procreation is lost is unknown. Ziemann notes that in Germany in 1910 for every 1,000 persons over 15 years there were 520 under that age, the corresponding figure in England being 442. Other data required are the sex proportion in infants, in older children and in adults. Whereas the ratio of male to female children in Germany was between 105 and 106, in Africa it was 102; in the South Sea much more. A high proportion of men to women is believed to be a sign of race degeneration.

Other data wanted are the number of births per 100 women capable of bearing, including still-births and miscarriages; in Germany the figure in 1909–11 was 121: the infantile mortality (first year of life), and the mortality between this period and the onset of puberty; this is low in Europe but high in natives: the causes of mortality at both these periods.

The causes of child mortality discussed in detail are, miscarriages, custom of infanticide and exposure of children, lack of expert assistance in childbirth, failure of milk in native women, lack of suitable food, diseases.

*Abortions* may be natural or induced. Natural abortions are caused by malaria and possibly relapsing fever; by syphilis, under-nourishment of the mother and other causes. The ways are described of estimating the effects of malaria on infantile mortality in regions of epidemic and of endemic malaria; in the last named comparison must be made with a neighbouring healthy region. In India, after a severe malaria epidemic, there was a fall in births, reaching its lowest point 9 months after the malaria had attained its maximum. Induced abortion is found in all colonies. Pregnancy is interrupted if the woman believes that owing to either lack of milk or underfeeding she cannot nourish the child; tribal customs are another cause. Little is known of the

means employed, but it is probable that the woman is often left sterile.

The custom of *infanticide* is widely spread. Deaths of mother and child from *want of skilled help* at birth is, he says, not infrequent. The *milk often fails* because the mother is insufficiently nourished. The period of lying-in varies much with the tribes; with one tribe named it is a fortnight, but much more frequently it is one, two, or three days, after which the mother resumes heavy field work. This Ziemann thinks must injure the milk production. Many infants are suckled to the second or third year of life.

The milk of cows, asses or goats is not given, but indigestible carbohydrates are, and do great damage, causing severe intestinal catarrhs. The author points to the advantage of persuading the natives to use other milk when human milk fails, but notes that owing to disease there are insufficient cattle. There is an intimate connexion between the breeding of cattle and of men. Among *diseases* malaria, and intestinal and worm diseases are the most important, but there is little exact knowledge; measles is put high in some reports.

### 3. *Measures for increasing the births—*

Here are discussed the means of getting rid of child marriage, and of heavy work for women, the regulation of wife purchase and polygamy. In Usukuma in East Africa girls are married at 8 or 9 years. If such bad customs are to be extirpated the reason must be explained to the natives, who must be persuaded that the change is for their own good. With the introduction of agricultural machinery it may be possible to spare the women heavy work on the land. In some colonies the price of a wife is so high that they become the property of capitalists past the procreative age. One African chief had 300 wives, but not more than 136 children. If the women had each a husband the total fertility might have been tripled. Customs such as these can be changed only gradually.

Under the heading, Government Measures, a number of other means are discussed for improvement of health in the colonies. They include the instruction of all Government officials, as well as doctors, in all that pertains to tropical and native hygiene; increase of sanitary personnel; systematic instruction of the whole population (1) at conferences of chiefs, (2) in government and mission schools, (3) by means of cinematograph displays illustrating physiology and hygiene, and explained preferably by a native at native gatherings such as markets; formation of sanitary boards in all the larger towns; hygienic supervision of all agricultural and industrial undertakings, as far as natives are concerned, and hygienic control of rest houses; regulation of drug stores so that drugs such as quinine are available to natives free or at cost price; development of the government laboratories found in most colonies into research institutes to investigate disease and disease carriers; formation of agricultural institutes to conduct systematic enquiries into vegetable foods which are found in the colony or might be introduced. Potatoes introduced into the highlands of the Cameroons were gladly cultivated by the natives. The agricultural institute would form a collection of all fruits, drugs, and poisons, and would, above all, further the culture of cereals. Rice culture could be greatly extended, and, preferably, mountain rice, to avert the danger of malaria infection. The institute would also introduce the art of baking bread, which is little known among natives, who, however, eat European bread with avidity. The study of edible oils is of great importance. It would provide on a large scale a

supply of reliable drinking water at all places in the colony, and see that trade routes and road junctions had springs, etc., so enclosed as to render infection impossible. By means of the schools it would instruct the natives in the food value of their articles of dietary and draw up tables for the use of the employer of labour. Child study would be pursued at one or other institute, the feeding of children and children's diseases, and breeding of cattle, for the lack of which in part the native is under-nourished. This includes the study of animal diseases. Agriculture, cattle breeding and increase of human population are in the tropics closely linked.

### MISCELLANEOUS.

DUREN & LEJEUNE. *Voyages d'Études au Brésil.*—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1923. Nov. Vol. 3. No. 2. p.p. 77–155.

The sanitary organization of the United States of Brazil is described in all its official detail in this paper. The sanitation of the ports and large towns is said to be well planned and well administered; that of the vast interior is happily described as “establishing itself progressively.”

The sanitary administration of the whole country is centred in a Department of Public Health under a Director-General. Into the personnel and structural details of this Department it is unnecessary to proceed further than to mention the three immediately subordinate Directors, respectively, of Municipal Sanitation (for the Federal District), of Rural Sanitation (for the whole country), and of Maritime and River Sanitation (for the whole country). The Director-General and 3 Directors, along with the respective Heads of the Army and Navy Sanitary services, the Professor of Hygiene of the University, the Professor of Sanitary Engineering of the Technical School, and the Advocate-General, constitute a Council of public health under the presidency of the Minister of Justice. This Council considers the proposals and resolutions of the Department of Public Health and submits them to Congress.

The regulations for dealing with Yellow Fever, plague, cholera, typhus, smallpox and other epidemics do not demand notice; but something may be said of the measures actually in existence for the control of tuberculosis, leprosy, and venereal diseases.

*Tuberculosis*, which is prevalent in Rio and becoming noticed in Bahia and Saint Paul but very little in evidence elsewhere, first attracted attention in 1899. In Rio, where it and infantile mortality are the two most important elements of the death-rate, the mortality from tuberculosis in 1921 was 3·9 per mille. The disease, of which 96 per cent. was pulmonary, occurs chiefly among the poorer classes, who are addicted to alcohol and are debilitated by ankylostomiasis and malaria. Bovine tuberculosis is not common. For dealing with tuberculosis at Rio there are six dispensaries and fourteen visiting nurses; there is, of course, a bureau and a flawless code of regulations, including obligatory notification, to which private practitioners strongly object. In Saint

Paul also there are some tuberculosis dispensaries, but nothing has been done elsewhere.

The statistics of *leprosy* are allowed to be not reliable; the number of lepers in the country has been estimated by LUTZ as 20,000 and by RABELO as 10,000. The States most affected are Minas Geraes, São Paulo, Maranhão, Pernambuco, and in Rio de Janeiro there are known to be about 3,000 lepers. At Bahia there is an antiquated lazaret, and at Rio there is a leper hospital.

*Venereal disease* is much prevalent throughout Brazil, not only in the towns but in the interior of the country. Syphilis is regarded by the Brazilians as a trifling and merely unlucky disease. Unfortunate females are extremely numerous, and they are doubly unfortunate because they are not officially recognized and treated, although they wish to be. At Rio there are 15 free dispensaries for antivenereal treatment and a staff of visiting nurses, and instructional propaganda is carried on, all under a Director and Bureau. In other States there are a few dispensaries.

As an adjunct to the Antivenereal Bureau there is a cancer section. The deaths from cancer, which in 1903 were 33·9 per 100,000 in Rio and 29 per 100,000 in São Paulo, had increased in 1917 to 50·9 and 59 per 100,000 respectively.

The Department of Rural Sanitation is a very recent affair and has still to contend with the ignorance and prejudices of the population. The Director, with his office, laboratories, and other apparatus, is located in Rio. Distributed among the States are 16 District Chiefs, each of whom has a very free hand in administering his own province. The executive machinery is established in rural sanitary outposts, of which there are altogether about a hundred at the present moment. In each outpost there is at least one doctor, a microscopist, a secretary-store-keeper, a staff of medical subordinates, and a corps of labourers, and each is equipped for receiving and treating out-patients, for operations, and for microscopic investigations, and is also furnished with the transport (horses, boats etc.) necessary for inspection work. The outpost thus appears to render medical assistance to the rural population as well as to implant the principles and practice of sanitation. The sanitary routine of the outpost includes inspection of houses, latrines, wells, surface-drainage, etc., the rectification of defects, and the detection and treatment of cases of disease. Census operations are included in the statistical work.

In addition to the machinery already mentioned the Department of rural sanitation includes a staff of six medical men, under the orders of a chief, whose duties are to travel through the country and impart elementary instruction in hygiene to the population, in schools and elsewhere.

The author gives a full account of what is being done by the Department to control malaria, helminthiasis, trypanosomiasis, leishmaniasis, and trachoma. In connexion with malaria it is to be noted that although it is most widely prevalent in Brazil, yet there are extensive rural tracts—particularly in the State of São Paulo—which are free from malaria though all the necessary conditions appear to be present. Another noteworthy item is that the large towns in southern Brazil are free from malaria (except in the suburbs), while those of northern Brazil (Bahia, Pernambuco, Belem) are strongly infected.\*

\* Summarized by Lt.-Col. ALCOCK.

COMBY (J.). *Un voyage médical au Maroc*.—*Presse Méd.* 1923. July 11, 18 & 25. Vol. 31. Nos. 55, 57 & 59. Supplement. pp. 1145-1153; 1189-1205; 1229-1238. With 28 text figs. [4 refs.]

This is a report of a tour of medical inspection in the French Protectorate of Morocco. The writer is enormously impressed with the sanitary revolution that has been effected in the short term of ten years in a country not long since scourged by plague and typhus and smallpox, where malaria is rife, where tuberculosis works havoc in towns and villages, where the population is saturated with syphilis, and where a cynic might have been pardoned for regarding the frightful infantile mortality as a disguised blessing. He writes with almost overwhelming appreciation both of the foresight and of the results of French policy, and his justification may be found in the following dry details.

The new port of Casablanca, where the author landed, has become a fine European model. Its population, which was about 30,000 in 1911, had increased in 1921 to more than 103,000, not including a large floating element. Here the care of the public health is in the hands of the Director of Army Medical Services. The medical institutions include a military hospital of 500-635 beds, a civil hospital of 160 beds, a natives' hospital of 4 pavilions for men and for women, a central pharmacy where drugs for the whole country are prepared and stored, an anti-tuberculosis dispensary, and a venereal dispensary where also the "filles soumises" are under prophylactic administration. The sanitary institutions include a "Goutte de Lait," where infants are seen and obtain sterilized milk and pap, a "Pouponnière" where young children are received and cared for and whence sterilized milk is distributed, a children's dispensary where vaccination and other treatments are performed, a municipal milkery where 52 first-class cows are stalled to feed the children's institutions and hospitals with milk, and a lazaret into which the beggars are raked and cleaned and loused and disinfected.

Mazagan, a salubrious town swept by sea-breezes, contains about 20,000 inhabitants. Besides hospitals for Europeans and for natives it is the head-quarters of one of the mobile hospitals that carry European medicine and French prestige into the interior.

Safi, an Atlantic port with a population of about 25,000, seems to be distinguished for its enormous infantile mortality; of the recorded deaths (year not stated) among the native population exactly half are children.

Mogador, though enveloped by sea and lagoon, is very little malarious. Besides the ordinary medical institutions it possesses a modern lazaret. Syphilis is rampant among the Mahomedan population, and abortions due to it are countless.

Marakesh (Morocco), the southern capital, is a walled town in a vast plain and contains about 150,000 inhabitants, including 15,000 Jews and several thousand Europeans. MAUCHAMP, who two years afterwards was assassinated, established a dispensary here in 1905: the fine new hospital for natives, named in memory of him and opened in 1915, contains 146 beds, in pavilions. Adjoining it are a large out-patient dispensary and a venereal clinic. The Military Hospital, installed in a former Sultan's palace, contains 175-200 beds besides an isolation pavilion and pavilions for officers and for European maternity cases. A "Goutte de Lait" was established in 1922 and is popular; it is administered by Franciscan sisters under medical

direction ; vaccination is carried on, besides distribution of sterilized milk. A mobile dispensary works from Morocco. Although Morocco is little malarious and is considered a healthy town, fit in winter for consumptives, a good many Senegal troops suffer from pulmonary affections.

Rabat, founded in the 12th century by Yakub-el-Mansur, is a town of about 35,000 inhabitants in which the proportion of Jews (3,300) seems to be rather lower than usual and that of Europeans (10,200) higher. Connected with the large military hospital there is a section of 100 beds for civilians, also a vaccine and an antirabic centre. The hospital for natives, opened in 1918, has 120 beds ; a mobile dispensary is based on it. The maternity hospital would do credit to a European capital ; annexed to it are a "Goutte de Lait," distributing sterilized milk, a "Pouponnière," a Nursery (33 boarders) and Crèche, also a Sun-garden for physical culture of weaklings. Franciscan sisters render much assistance in these institutions. An anti-tuberculosis dispensary and a dispensary for children are attached to the Bureau d'Hygiène. Besides the municipal institution for the management of prostitutes, there is a combined clinic for venereal and skin diseases where intravenous injections are given to thousands. An attempt to exact payment for injections had deplorable results for syphilis prophylaxis. The municipal Lazaret is well equipped but commendably unostentatious.

Sale, an old town of 22,000 inhabitants, has a good climate, but pulmonary tuberculosis is common, and among children ringworm is very frequent. Here, however, is the shrine of Sidi Ben Achir, where afflicted pilgrims innumerable come for cure, and here also is a convalescent home for the army.

Meknes, founded by Mulay Ismail, a contemporary of "Le Grand Monarque," stands at an elevation of 500 metres and is accounted the healthiest town of Morocco. Amid imposing ruins of his palaces the numerous aqueducts constructed by Mulay Ismail still keep the inhabitants, who number about 45,000, well supplied with good water. A very fine military hospital, built during the war, also provides accommodation for European civilians and a pavilion for maternity cases. The hospital for natives, built in 1921, has very extensive and complete arrangements for outpatients, including venereals. Outside the town is a larger hospital of 43 beds for natives. Tuberculosis is rife in Meknes, more so among the rich (in whom a taste for alcohol is spreading) than the poor. An anti-syphilitic dispensary for women is situated near the quarter inhabited by the "filles sourmises," who number about 250. A pitiable feature of Meknes is the native lunatic asylum, where, bereft of humanity, men and women are chained like animals.

Fez, the holy city, the most ancient and most famous of Moorish capitals, has a population of more than 100,000. It is really three cities, one of which, well removed from the others, is a modern European town. The military hospital, which stands in an immense garden and is also a *place d'armes*, contains a section for European civilians, a pavilion of 40 beds for women and children, and provision for maternity. There are two large hospitals for natives, one of 70 beds in the city, the other of 250-300 beds outside it. There is also an anti-tuberculosis dispensary and a dispensary for venereal and skin diseases. In the latter dispensary there were, in 1922, 23,543 operations for syphilis, 7,972 treatments of ringworm, and 16,196 treatments of other diseases

of the skin. Care of "filles soumises" is efficient. The native lunatic asylum, though here visited by a European doctor, is, like that of Meknes, under indigenous administration, and a scandal.

Sefrou, 28 kilometres from I'ez., is an oasis of running waters, groves, and orchards. The native infirmary, with few beds but ample provision for a crowd of out-patients, is one of a common Moroccan type. At Oudjda, the principal town of eastern Morocco, with a population of about 25,000, there is a separate European settlement. Besides the military hospital, with its sections for civilians, including women and maternity cases, and besides the native hospital, dispensary for prostitutes, and lazarette, there is a "Goutte de Lait," where, however, only condensed milk is available, and an Orphanage and crèche; these are administered by Franciscan sisters.\*

PETER (W. W.). **Observations on Public Health in the Orient.**—*Amer. Jl. Public Health.* 1923. July & Aug. Vol. 13. Nos. 7 & 8. pp. 531-538; 627-635. With 4 figs.

This paper contains probably the most instructive survey of health conditions in the various countries of the East that has ever been published. It is impossible to speak too highly of it, and one can only hope that it will attract the attention of the Government of India. The first section deals with the Philippines, Siam and the Federated Malay States; the second with India.

When the Americans took over the Philippines they inaugurated a thoroughly modern health organization. Since then much has been accomplished, in the short period of 25 years. The two outstanding features of the work are (1) a good foundation and (2) devolution to the point where practically the whole machine built up by Americans is now being operated by Filipinos.

"From the beginning there was little co-operation on the part of the people. For the first few years this may have been due to political reasons combined with general ignorance of what was involved. The first factor has been removed to a large extent, but the second is operating, and may be expected to continue until the results of the present educational policy begin to manifest themselves. Public health can never have sound foundations in a country where the percentage of illiteracy is as high as now obtains in Oriental countries. Coercive laws are not sufficient in the long run, because it takes too much money and machinery to carry them into effect . . . .

"I was told that the public-health machine started by Americans has suffered deterioration upon being turned over to the Filipinos. This should give no one serious concern. It would have been surprising had such a slump not taken place in the process of devolution. The commendable thing is that both sides saw the wisdom of making the transfer, which had to come some time. The present machine is working more smoothly each year. The legislature is also inclined to grant money for public-health work. In 1919, \$1,270,268 was appropriated from the national treasury for public health, and this sum was increased by \$100,000 the next year. In addition to these amounts, the various local governments appropriated \$434,000, making a total of about seventeen cents gold per capita for public health, which is not a bad showing in a country where the public-health movement is comparatively young."

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\* Summarized by Lt.-Col. Alcock.

The writer lays great stress also on the work done by the Child Welfare Centres both as directly affecting the health conditions and as centres of enlightenment.

*Siam* covers an area of 24,390 sq. miles and has a population of 8,266,000, the largest number of imported residents being Chinese. The capital, Bangkok, has a population of 324,000. The Siamese Red Cross Society takes the place of the Government Public Health organization of other countries and is closely associated with Government itself. At Bangkok one finds modern hospitals and very finely equipped laboratories and Government dispensaries.



FIG. 27.—A section of a public health exhibition under auspices of the Siamese Red Cross, at Bangkok, Siam, illustrating the cause and methods of prevention of hookworm disease.

[Reproduced from the 9th Annual Report of the International Health Board, 1922.]

"Under Government auspices 3,418,444 vaccinations were performed at the rate of 380,000 per year. On one occasion at the outbreak of a smallpox epidemic in an inaccessible region (Uhol) a medical officer with a large quantity of vaccine and 100 kilograms of emergency supplies was taken over the mountains by airplane and thus reached the scene two weeks earlier than by ordinary methods of travel. The Red Cross now has a special airplane provided by popular subscription which can carry four sick or wounded or a corresponding load of medical supplies . . . .

"To provide one qualified doctor to every 2,000 of the population Siam needs 5,000 doctors, or 200 graduates a year for the next 25 years."

Vital statistics in Siam are still very unreliable, but since the introduction of registration the birth rate is shown as about 32 and the death rate about 31. A pandemic of influenza caused 80,000 deaths. From Feb.-March 1921 there were 18,000 cases of cholera with 13,000 deaths.

"Here we find a stable, enlightened absolute monarchy, giving every evidence on the one hand of desiring to institute modern public modern



health procedures, yet on the other hand feeding the people large quantities of opium. The economic side of the question is the fact that about 35 per cent. of the total revenue of the government comes from opium. Out of a total revenue in 1919-20 of £6,424,117, as much as £1,935,131 was received from the manufacture and sale of opium . . . . .

"Nowhere in the Orient can we find a problem of national administration where opium plays so large a part . . . . .

"In 1918-19 out of a total of 2,986 primary, secondary and special schools, 563 were government and 2,423 were non-government. Out of total of 4,457 teachers in these schools, 2,825 were non-government. Out of 160,398 students in these schools 46,527 were in government schools and 113,871 in non-government schools . . . . .

"Coming from China, where it is the exception to find anything but the greatest indifference among officials of all classes regarding the importance of public health, Siam presents an encouraging contrast. The officials are justly proud of what has already been achieved. Relatively large sums of money have been and are being expended for public-health work. One gains the impression that public health has been placed near the top of the government lists and that progress will be made as rapidly as ways and means can be found."

*Federated Malay States.*—The facts concerning this country are well known to all our readers through the Government Annual Reports.

"Public Health work in the Orient is of two kinds, that started from within and that added from without. What one sees in the Malay Peninsula offers perhaps the best example of the second kind, for all administrative affairs are directly or indirectly in the hands of the British Government. There can be no question but a great deal of the prosperity of this region is due to the effort which is being expended in safeguarding health . . . . .

"The country in comparison with some of the other regions of the Orient is new and therefore more easily administered in the absence of deeply rooted social and religious customs. The mere fact that a large part of the population is immigrant, that is, people who by leaving their native lands have shown a willingness to break with old things, makes the question of public-health administration much easier than in a country like India, where the ruts are deep and where too much pressure is interpreted to be an interference with personal liberty. Political agitation is absent, and those in charge have a clear field before them. Having the support of those engaged in commerce and in the great rubber industry there is always the backing the public-health man feels is necessary."

*India.* In the second paper the writer discusses the condition of public health work in India; he goes into the history of the work, the population, birth and death returns, and quotes from annual reports, etc., to illustrate his survey. Many of these facts are thoroughly well known to all acquainted with the situation in India. He concludes his remarks thus :—

"In drawing all this discussion to a conclusion let me pass into regions where the ice is thin and the waters are deep. The present state of health conditions in India I would attribute chiefly to four causes; politics, poverty, ignorance and religion, with what seems to me the most important last.

"I have quoted from reports showing where politics interfered with carrying on public-health work. Non-co-operation has caused some

queer ideas to become bedfellows. A non-co-operator will refuse vaccination because it is British. He will ride on a train and use the telegraph and postal systems in spite of their being British. I met some of these men. To one of them I said: 'I cannot understand why you want to force out the British [by] boycott, the public health men who advocate vaccination for example. If you were wise, you would strengthen your hand by making the fullest use of existing facilities for protecting the health of the people. Why not keep right on taking the medicine out of the spoon even up to the moment you grab spoon and bottle away from them—if that's what you are after, to be your own political doctor or at least consultant. India should keep on taking her health medicine. The British won't put poison in the spoon. They haven't the imagination.' But all I received was a weary shake of the head, indicating that I did not understand. In the meantime the total number of vaccinations fell 11·5 per cent., that is, from 10,870,446 to 9,624,235, in one year. The decrease was general through all the provinces and the chief explanation seems to be the political reason mentioned.

"Poverty is a real obstacle, as we all know. It is often said that fifty million people in India never get all they want to eat. Poverty in India has many roots; continually impoverishing the soil by burning the needed manure, early marriage and too many children—a host of causes, many of which are not without a direct bearing upon public health.

"I wonder if I may speak frankly about the religious side of the health question without being misunderstood. The atmosphere of India, social, educational, political, is surcharged with it. I found more of it to the square inch than in any country I ever visited, and of a more pronouncedly disagreeable type . . . .

"At every turn the public health man is blocked by religion and custom, and no outsider can tell where the one leaves off and the other begins. Caste may be considered as a social custom, but it had its origin in religion when the Brahmins claimed that they were better than ordinary folks. Turn whichever way he will, the aspirations of the public-health man are ground to dust in the mill-wheels of religion. If he dares so much as to whisper against prevailing practices, the backs of the people are raised at once because he is interfering with religious freedom . . . .

"Religion kills more people in India to-day than the British public-health machine could save if it were trebled in size. I am not dwelling unnecessarily on a subject which concerns only a small fraction of the population. The census of 1911 gave the following religious statistics:

Hindus	...	...	...	...	217,586,892
Mohammedans	...	...	...	...	66,647,299
Buddhists	...	...	...	...	10,721,453
Christians	...	...	...	...	3,876,203
Sikhs	...	...	...	...	3,014,466
Jains	...	...	...	...	1,248,182
Parsis	...	...	...	...	100,000
Jews	...	...	...	...	20,980
Miscellaneous	...	...	...	...	37,101

"So the majority of the people, instead of having a religion which stimulates them or at least tolerates the improvement of living conditions, have a sedative which lulls them into believing and hoping that the next turn of the wheel of fate may see them in a better state—perhaps.

so high up in the scale of things as to be reincarnated as a Brahmin or something equally desirable (or detestable, depending upon one's point of view). In the meantime the public-health man has to make the best of a bad situation and fight against great odds.

"Ignorance is another stumbling block in the path of the public-health man in India. Census returns show that among males 16,938,668 are able to read while 143,480,620 are not, even though there are 28 different languages to choose from to make the test. With women the situation is still worse, 1,600,763 being able to read while 151,397,030 are totally illiterate.

"The seeds of public health have been planted in every large country in the Orient. In no country has public health reached a stage of development comparable with European countries. The work may still be considered to be in its infancy. The drawbacks which apply particularly to the Orient are poverty, ignorance, and in some instances religious and political considerations. With the exception of Japan, the whole science of public health may be said to have been introduced into the Orient by foreign nations, and in no country has it become entirely indigenous. Public Health will not become firmly rooted in Oriental soil until the people make it a part of themselves. The greatest means for advancing public health in the Orient at the present time lies in actual demonstrations and education."

WU LIEN TEH. *China's Place in the World Health Movement.*—*Nat. Med. J. China.* 1923. June. Vol. 9. No. 2. pp. 148-159.

A discursive article, which deals with a memorandum from the League of Nations and the visit of Dr. Norman WHITE to China. It ends with a description of certain other phases of activity of the Health Section. The following paragraph gives a lurid picture of the state of affairs in China.

"Present health activities in China.—In spite of several attempts on the part of leaders of public health thought to keep this country abreast of the times, the government authorities have not yet taken up the matter seriously. The responsible work is still neither cohesive nor coherent, and the initiative is given to men untrained in the latest labour saving and money saving methods. The enforcement of sanitary measures is left in the hands of poorly educated, poorly paid police officers, who with their underlings are often quite ignorant of their real duties. Taxing of shops, rickshas, carts, prostitutes, theatres, and the licensing (the more the merrier) of unscrupulous venereal disease quacks appear to be their chief concern. The prevention of overcrowding, supervision of food and water, recording of births and deaths, being non payable assets, are quite overlooked. It is true that, in Japan, the main health authority of a town is the chief of police, with a medical man under him, but the latter is a trained man and his advice is usually followed. In China the sanitary assistant is often a mere Chinese scholar with no knowledge of medicine or modern health work, and hence the results obtained are negligible."

HEALTH. Melbourne. 1923. Sept. Vol. 1. No. 8.

The September number of this Australian journal contains many excellent articles. One by Phyllis CILENTO gives a very good survey of the whole subject of dietary for hot countries.

The second article deals with the physical fitness of different races in

tropical countries, and it is gratifying to learn that the northern races, particularly the British, give the most satisfactory out-turn of work under adverse conditions.

Other papers are Housing, by T. W. SINCLAIR; Post sanatorium considerations, by Keith R. MOORE; Women in factories, by Frank R. KERR.

Under the head of Notes is an extremely interesting article on the pollution of streams and other natural waters of Australia. The writer states that the amount of pollution is increasing in Australian rivers; measures should be taken at once to complete the legal aspects of the subject in order to conserve the water for drinking purposes.

"As a measure of first importance the necessity for gaining more complete knowledge regarding the quality of natural waters, the sources and character of existing pollution, and the effect of such pollution upon natural waters, is again emphasized, and the desirability of having public health laboratories equipped to carry out these investigations is pointed out.

"Prevention should be organized while it is simple and cheap. 'A sincere adherence to that principle, and its vigorous application through sound and comprehensive legislative measures, far-sighted administration, and the best technical service to be had, will save Australia the tragedy of the numerous spectacular outbreaks of water-borne disease which have disfigured the health calendar of many of the older countries which have been forced to learn by sad experience.' It will also save limitless trouble and expense in remedial measures."

MANN (W. L.). **Some of the Functions of the Naval Medical Personnel serving in the Field, with Special Reference to Field Sanitary Measures.**—*U.S. Nav. Med. Bull.* 1923. Dec. Vol. 19. No. 6. pp. 735-813. With 31 text figs.

This is, practically, a sort of Field Service Manual for American forces. It occupies some 80 pages of the Journal and deals with camp latrines and sanitation, the hygiene of marching and care of the feet, water supply, anti-fly measures, etc., as well as organization of hospitals and duties of the bearer corps. It will be useful for those interested in this particular branch, but it contains little that is not to be found in the British publications on the same subject.

ROBERTSON (H. MCG.). **Automobile Cost in Rural Health Work. Report on Operation of Automobiles in Co-operative Rural Health Work in Virginia.**—*Public Health Rep.* 1923. Aug. 31. Vol. 38. No. 35. pp. 2012-2016.

The writer gives some figures concerning the cost of up-keep and depreciation of motor cars supplied to Officers on Sanitary duty in Virginia. The actual figures are not of general interest, because no two parts of the world are the same, but it may be pointed out that the running costs of a 22½ h.p. motor worked out at approximately 41.69 dollars per month. 34 automobiles were purchased, 10 were not in use at the time of the report, 2 were transferred, and 22 were sold, 14 at a profit and 8 at a loss. We consider the main point of interest to be that the automobiles were supplied to the Officers free by the Authorities employing them.

CORPUS (Teofilo). **The "Hilot" and "Salag" versus practising Physicians and Health Workers.**—*Monthly Bull. Philippine Health Service*. 1923. April. Vol. 3. No. 4. pp. 133-135.

The writer deals with the indigenous midwife and her attendant in the Philippine Islands. She appears to be an altogether ignorant person and frequently responsible for infection of the mother at child-birth; indeed she is similar in every respect to the Indian "dhai" about whom a great deal has been written. The writer says that at present it is impossible to banish this type of midwife but before long it is hoped to substitute a properly trained nurse.

DINGUIZLI. **De la nécessité de créer des auxiliaires visiteuses musulmanes pour propager les notions d'hygiène dans la population indigène en Tunisie.**—*Bull. Acad. Med.* 1923. Dec. 27. Year 87 Vol. 90. 3rd Ser. No. 44. pp. 613-624. (Rapport présenté par M. V. WALLICH. pp. 611-613).

The writer gives an extremely interesting account of the conditions of childbirth in Tunis. It is extraordinary how similar this problem is in practically all parts of the East. The description tallies almost exactly with that of the Mohammedan household in India and other hot countries.

The remedies tried are also the same, namely, the provision of properly educated Mohammedan midwives and of schools where they can be trained. A course of studies is outlined. It differs very little from that of other organizations.

AMERICAN JOURNAL OF PUBLIC HEALTH. 1923. July. Vol. 13. No. 7. p. 588.—**Rockefeller Foundation is Ten Years Old.**

The expenditures during the first decade, 1913 through 1922, have amounted to seventy-six and three quarter millions dollars (\$76,757,040), roughly divided as follows:

Public Health \$18,188,838; Medical education \$24,716,859; War relief \$22,298,541; all other philanthropic work \$10,445,628; administration \$1,107,174.

HEALTH FORUM. 1923. Sept. Vol. 1. No. 3.

"Health Forum" is the official organ of the Public Health Association of Australasia and is published quarterly. Some of the contents of the September number may be noticed. "The Modern Sanitary Inspector," by J. ELKINGTON, is written in a distinctly light vein, as the following amusing extracts show.

"Those concerned with food inspection may be interested to recall that the official beer-tester of mediaeval days in England was an important functionary who may fairly be claimed as a forebear of their own. He did not use a hydrometer, nor did he divide his sample into three parts. His sampling outfit consisted of a pair of leather breeches and an oaken stool, and with this simple apparatus he made his analysis on the spot. The technique was to call for a measure of beer, pour a little on the stool, sit on it in the official leather breeches, and consume the remainder of the sample. If the breeches stuck to the seat after a reasonable period of contact, the beer was classed as satisfactory. If not, proceedings eventuated. If the vendor were found guilty he was

condemned to stand in the stocks, to have a measure of the adulterated product poured over his head, and to drink the remainder. The sanitary administrator of to-day is sometimes tempted to regret that these simple and homely but certainly effective penalties have been allowed to fall into disuse . . . . .

"A favourite prophylactic measure in those days was to collect and burn all Jews. One would be inclined to conclude that the profound impression liable to be made on the very acute minds of this intellectual people would have resulted in producing a great Jewish sanitarian during mediaeval times, but no record of such has come down to us . . . . .

"The death rate from diphtheria in 1916 was the same as it was in 1896, and diphtheria has spread uninterruptedly for years past. It killed 917 Australians in 1921. We lose 8,000 to 9,000 infants every year, of which the majority die from preventable causes. Over 1,700 children under two years of age die annually of diarrhoea. Tuberculosis kills another 3,500 Australians annually, of whom the great majority are at the best working ages. More than 200 Australian women die of puerperal septicaemia every year. Typhoid fever killed 352 Australians in 1921 and pneumonia slew over 2,000 more."

The writer then goes on to lay down what he considers to be a sound method of training for sanitary inspectors under Australian conditions.

"Sewage Treatment in Unsewered Areas, by E. COBB, discusses the case of isolated houses where sewers and the water method of sewage removal is impossible. The tank described is very similar to those used in country houses in England, the dimensions recommended would be approx. 6ft. deep, 2ft 6ins. wide and 13 ft long. The writer also recommends twin tanks.

## REVIEWS.

VAUGHAN (Victor C.), assisted by VAUGHAN (Henry F.) & PALMER (George T.). **Epidemiology and Public Health. A Text and Reference Book for Physicians, Medical Students and Health Workers. In Three Volumes. Vol. I. Respiratory Infections.** 688 pp. With 83 figs. **Vol. II. Nutritional Disorders. Alimentary Infections. Percutaneous Infections.** 917 pp. With 53 figs. 1922. London: Henry Kimpton, 263, High Holborn, W.C. [Price 45s. net each vol.]

The author of this valuable work is a man of large experience, who from childhood has been in observant contact with sanitary problems. He has been "through the mill" more than once, and has met and fought epidemics of infectious disease under many and varying conditions. Throughout the two first volumes, now under review, the reader may recognise with certainty the hand of the expert. The accumulated practical experience of a trained epidemiologist makes a book full of interest and educative value to those interested in Preventive Medicine.

The scheme of the volumes is the same materially for each disease dealt with. In general, for each malady there is a definition, an historical account, a discussion on the virus, the methods of infection, the susceptibility and prevalence, the incubation, and methods of control. Symptomatology and pathology are also included; for as the author truly observes such cannot be wholly divorced from epidemiology. The details under these subheads may be extensive or otherwise according to the opinion of the author as to their import from the main point of view of disease

prevention. The historical accounts are especially interesting and instructive and add in no mean way to the value of the work. Much is to be learned from the history of past epidemics.

There is in these two volumes a vast store of fact and information, not infrequently accompanied by quotations of extracts from original papers of investigators. To these are at times added the comments of the author, who gives his own considered and oft-times cautious opinion. One cannot fail to note how very largely experience gained during, or as a result of, the late war has been drawn upon in giving examples.

Large as these volumes are, one cannot at times but wish for more than they contain. There are certain omissions on which one would have valued the opinion of the author. Thus, there is no reference to the findings of the Committee of Enquiry regarding the prevalence of Pellagra amongst Turkish Prisoners of War, held in Egypt in 1918, which concluded that the disease was due to a deficiency in protein as gauged by its biological value.

One would have welcomed further information in the section dealing with Plague, especially as regards the rat and rat fleas. Medical men must nowadays perforce take considerable interest in zoology and especially entomology. Some account of the plague carrying fleas would not have come amiss, and surveys of the fleas of the genus *Xenopsylla*, occurring upon rodents of districts liable to plague infection, promise to be of great practical value for forecasting the probable incidence of the disease. Amongst the rat poisons, barium carbonate and squill receive no mention; on this side of the Atlantic, however, they are regarded with more favour than phosphorus and arsenic, which are advocated by the author. In the chapter on Typhus there is no reference to "Rickettsia" in that portion devoted to discussion of the virus. Similarly in Sandfly Fever no mention is made of certain spirochaetes which have been described within the last few years, and which are generally believed to be the causative organism.

But few of the statements in the book are open to challenge. One such however occurs on p. 830 of volume II, where in speaking of Persian Relapsing Fever the following is written: "Its distribution is a tick, *Argas persicus*." This statement, though the suggestion has been made by some observers, would be open to question and comment.

The book is written in a pleasant style which makes it very readable, and there is an abundance of illustrative graphs. The printing and the paper are good and the size of type used is convenient. The work may be confidently recommended as one which will justify in full its position in the library of those whose call in life is Preventive Medicine, whether they work in temperate or tropical climates.

G. E. F. Stammers.

THE ROCKEFELLER FOUNDATION. **Annual Report. 1922.** pp. xiii. 451. With 85 figs. New York. The Rockefeller Foundation, 61, Broadway.

This final report for the year 1922 includes, besides the President's review and the reports of the Secretary and Treasurer, which have been noticed already (see this *Bulletin*, Vol. 20, p. 856), the reports of the director of the International Health Board, of the director of the China Medical Board, and of the general director of Medical Education.

Amaid a number of miscellaneous items, the progress of organized measures for the control of yellow fever, malaria, and hookworm occupy a prominent place in the report of the International Health Board. An epidemic of yellow fever in Peru was overcome and an incipient outbreak in Honduras was checked, and in other parts of tropical America this disease was suppressed and *Stegomyia* subdued. Antimalaria operations included the inauguration and prosecution of field studies in Brazil, a

continuation of work in Nicaragua, the projection of surveys in Italy and in the Philippines, and co-operation in measures undertaken by the Government of Palestine. It is worthy of note that in a district of North Carolina, where other measures of malaria control were impracticable, administration of quinine is said to have brought about a reduction of 80 per cent. of incidence among the white population and 66.5 per cent. among the black. Large measures of hookworm control, which were begun in Virginia in 1910, and have extended in widening circles over America and Asia ever since, are still in process of being released to the various Governments directly concerned; but fresh ground is still being broken, and a survey is proposed for Spain. Among other activities of this Board during 1922 may be mentioned, anti-tuberculosis operations in France, which were gradually being resigned to the French authorities; the creation and encouragement of county health units, for the preservation of public health in small towns and rural areas, in the United States and in Brazil; assistance towards the installation of public health laboratories in various parts of the world; organization of a public nursing service in Brazil; co-operation with the Health Board of the League of Nations and also in the organization of a comprehensive public health authority in Czechoslovakia; and extensive assistance to technical education in hygiene and public health by grants for the establishment and equipment of appropriate schools in the United States, Brazil, and London, and by the endowment of fellowships, of which during the year 79 were granted to individuals representing 19 countries, for which an expenditure of 167,500 dollars was allotted.

The China Medical Board completed the 8th year of its active existence in 1922. In its report the Peking Union Medical College, which in June completed its first year of work in association with the new hospital, occupies a conspicuous place. [For some account of this institution see this *Bulletin*, Vol. 18, p. 146.] In the new hospital, during the year ended 30th June, the number of inpatients treated was 2,653, of which about one-third were women, and the number of outpatients' visits was 74,763; the number of autopsies was 33—only 21.5 per cent. of the number of deaths—the native prejudice against this form of research being still very strong. The health of the students and the junior Chinese staff of the College caused some concern in the matter of tuberculosis. In 1922 the China Board concentrated its efforts on the improvement of premedical education—i.e., practical teaching in physics, chemistry, and biology—in existing institutions in China. To this end grants were made for buildings and equipment, and for maintenance for a term of years, to the Universities of Nanking and Tientsin and to the Mission University of Peking, and assistance was also given to the Christian College of Canton, the St. John's University of Shanghai, the Fukien Christian University, and the Changsha Yale College. Beyond this, maintenance grants were made to six mission hospitals, and building grants to five, and fellowships and scholarships were granted to teachers and to missionary doctors, to an aggregate amount of 48,000 dollars, for the purpose of study in the United States and Europe.

The report of the General Director of Medical Education includes the details of divers fresh enterprises. These comprise undertakings to assist in the complete reorganization of the Royal Medical College of Bangkok, and of the Medical School of São Paulo, and to contribute, conditionally, 2½ million dollars towards the building and equipment of the medical college of the University of Iowa, the endowment of two chairs (surgery and medicine) in the University of Hong Kong, and the institution of research fellowships of which 26 were granted during the year on an allotment of 56,200 dollars.

The total disbursements of the Rockefeller Foundation for the year 1922 amounted (not including six million dollars given to Johns Hopkins University) to 9,911,408 dollars.

A. Alcock.



Cook (Albert R.) [C.M.G., O.B.E., M.D.] & Cook (Katharine) [M.B.E.]. **Amagezi Agokuzalisa (Ekitabo Ekitegeza Ebyokuzalisa). (Manual of Midwifery, in Luganda.)**—pp. xii. + 228. With 1 plate & 28 figs. London: The Sheldon Press, Northumberland Avenue. [Price 2s. 6d. net.]

It is obviously impossible for one who has no knowledge of the language in which a book is written to review it in the ordinary way, but, thanks to the excellent preface, to the table of contents, and to the frequent use of English and Latin words throughout the text, a fair idea can be obtained of the scope and general character of this elementary book on midwifery in the Luganda language. The whole subject, including brief chapters on general anatomy and physiology, venereal diseases, hygiene and sanitation, and some tables of prescriptions, is compressed into 225 small pages. The book, therefore, must be rather of the nature of a notebook; but the authors remark, very reasonably, that it is important to make a start, and "to get something into print which can be hammered at, and shaped by actual experience in the class-room and hospital wards."

Dr. and Mrs. Cook draw a very sombre picture of the public health in the Uganda Protectorate. The statistics, kept over a long series of years at the Mengo hospital, show that 17-20 per cent. of the natives are suffering from active venereal disease, and that 80 per cent. have, by their own admission, had syphilis at one time or another in their lives. It should be remembered, however, that these statistics were presumably obtained from persons who sought admission to the hospital because they were ill, and it does not necessarily follow that the figures are applicable to the population at large. And the same criticism may be made of the statement that two out of every three Baganda mothers have had syphilis at one time or another. Nor, as the authors admit, can one attach implicit faith to the official birth and death returns, which, for the seven years 1914-1920, were respectively 219,854 and 228,666.

In 1919 organized training of native midwives was begun. Only girls of a fair general education are accepted for training, and the course lasts from one to two years; three contingents have already passed out of the school. The authors speak enthusiastically of the intelligence of the Baganda. The reviewer, who has had some experience of the training of native midwives in the East, is agreeably surprised to learn that it is apparently possible to select only those "of a fair general education," and that no reference is made to any difficulty being found in obtaining a sufficient number of students.

The book appears to be an excellent one, and well calculated to accomplish the object which the authors have in view. It contains about two dozen good illustrations and diagrams, reproduced from established textbooks. The binding and printing are admirable, and, thanks to a generous grant from the Government of Uganda, the book is for sale at a very moderate price.

H. J. Walton.

SOCIETY FOR PROMOTING CHRISTIAN KNOWLEDGE. **Tropical Hygiene for African Schools.**—64 pp. With various figs. 1922. London: S.P.C.K. House, Northumberland Avenue. New York & Toronto: The Macmillan Co. [Price 8d. net.]

We imagine that the aim of a primer of hygiene for schools, whatever their clime, should be to impart the material of a few mental pictures wherein the child can recognize itself and its familiar surroundings under improved sanitary conditions. The young African, for instance, should be led to idealize himself, sleeping perhaps under a mosquito-net, in a clean dry weather-tight hut, in a clean unobstructed well-drained village standing well clear of jungle and swamp; to picture himself performing his

due matutinal purifications in places set properly in bounds apart; to imagine the elders of his village jealously guarding the common sources of the drinking-water from outrage: he should, in brief, be impressed with the lurking dangers of his environment and should be led towards some understanding of the ways whereby, under Providence, he can protect himself.

The little sixty-four page treatise, entitled "Tropical Hygiene for African Schools," under review is too diffuse and desultory and deals too much with unfamiliar (and unexplained) detail to convey any clear sanitary lessons to African children. It contains too many technical terms and too much that is not hygiene at all—such as the treatment of haemorrhage and of various kinds of accidents and the management of specific fractures. It states no great simple truths and enforces no wide principles of sanitation. Its picture of a microscope, with every part named but not explained, is, alas, its fitting emblem.

A. Alcock.

RIVERS-SMITH (S.). [O.B.E., M.A.(Cantab.), Director of Education, Tanganyika Territory.] **Afya. Kitabu kwa School za Afrika ya Mashariki.** [Health. A School Book for East Africa.]—pp. x + 110. With 33 figs. 1923. Calcutta, Bombay, Madras and London: Macmillan & Co., Ltd.

In this little book, written in Ki-Swahili, entitled *Health*, the author, who is the Director of Education in Tanganyika Territory, in his English preface points out the important place hygiene should take in the administration of our African colonies and sees in the native schools a means whereby some of the elementary principles of that science may be inculcated on the younger generation. The book is intended for use in these schools as a kind of text-book and is, we believe, the first of its kind. In Ki-Swahili the author is lucky in having a medium giving a range of expression not afforded by every African language, and on the whole he has succeeded in his task and produced a book for which there was a real want. In successive chapters the conception of health and disease is explained, clean air, clean water, good food, etc.; the functions of some of the organs of the body are next dealt with, followed by sections on the parts played by mosquitoes, flies and rats in the spread of disease and how these pests may be dealt with, and, lastly, there are short chapters on ankylostomiasis, consumption, bilharziasis, ulcers, yaws, etc. The following few criticisms may be offered, though the reviewer is aware that the evidence afforded by natives using the book will be of greater value in serving to show where any modification may be useful in subsequent editions.

One feels that the author goes a little too deeply into questions which the native will hardly comprehend, questions about which the average European resident in East Africa knows little and about which it is unnecessary for him to know more. The subject matter of some chapters is a little uneven; thus in dealing with the prophylaxis of plague much space is given to rat destruction, but the use of anti-plague inoculation is dismissed in a single sentence; in the same way the epizootic among rats might have been better explained. Allusion may also be made to the question of illustrations. Illustrations in books may have one of two functions, either to attract the reader, generally the illiterate reader, or to further the explanation of some point of the text when concrete examples are not to hand. In such a book as that under review the illustrations should belong to the second category, whereas they savour of the former. The picture of a bad type well is almost undecipherable on the one hand and on the other the diagrammatic representation of a good type—European built well and pump—must be a little difficult for the native to interpret. If the book is to be of practical value it must show the native methods he can himself adopt. The illustrations of a human heart, of a

rat, of a male and female hookworm, are poor, and can surely serve little purpose. In future editions one would like to see either no illustrations, the teacher depending entirely on concrete examples, easily obtained, or the illustrations should be of a better order and more useful.

In some chapters the question and answer method has been used, quite a useful one, but if used, should it not be adopted throughout?

The book, as the author says, is an innovation, and its value will increase with further experience and subsequent editions.

H. S. Stannus.

TROPICAL DISEASES BUREAU.

# SANITATION SUPPLEMENTS

OF THE

## TROPICAL DISEASES BULLETIN.

### APPLIED HYGIENE IN THE TROPICS.

By LT.-COLONEL W. WESLEY CLEMESHA, C.I.E., I.M.S. (retd.).

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SUPPLEMENT No. 2.]

1924.

[JUNE 30.

### DISEASE PREVENTION.

ROCKEFELLER FOUNDATION. **International Health Board. Ninth Annual Report, January 1, 1922-December 31, 1922.** [ROSE (Wickliffe), General Director.]—pp. xix+169. With 64 figs. Jan. 1923. New York: 61, Broadway.

The year 1922 was one of very great activity for the International Health Board of the Rockefeller Foundation. It is quite impossible to deal adequately with the various spheres of usefulness, but a few of the charts and pictures are reproduced (Figs. 28, 29 and 30). On the subject of hookworm disease a map of the activities in Siam is given and also a diagram for the Vere area in Jamaica showing the results of an extensive campaign of treatment. In the sphere of research Dr. CORT's work may be mentioned.

"He and his associates have been able to show that it is a common thing in nature for the larvae to complete their second moult and lose the sheath in the soil, and that such larvae are infective then as well as when sheathed. Their studies also indicate that while swine are to be regarded as important disseminators of the parasite, the activities of chickens are on the whole more beneficial than harmful."

According to this authority the larvae do not live longer than 6 weeks under the conditions prevailing in summer in Trinidad and British West Indies, but they are capable of traversing 3 ft. of light sandy loam. The work is confirmed by Dr. HAMPTON in Ceylon; hookworm larvae buried at a depth of 12 in. will find their way to the surface in about 5 days.

Concerning the use of carbon tetrachloride the following is of great interest:—

"To sum up, then, it may be said that the early experience seems to indicate that carbon tetrachloride is a better drug for the treatment

of hookworm disease than chenopodium, thymol, or beta-naphthol. In doses of 2 cc. for adults it is extremely efficient in the removal of worms and there is less probability of serious intoxication or even severe symptoms than by routine treatment with chenopodium in 1-5 cc., thymol in 3-gram, or beta-naphthol in 4-gram, doses. The only exception to this rule appears to be found in those cases in which the liver has been weakened by alcohol or other causes.

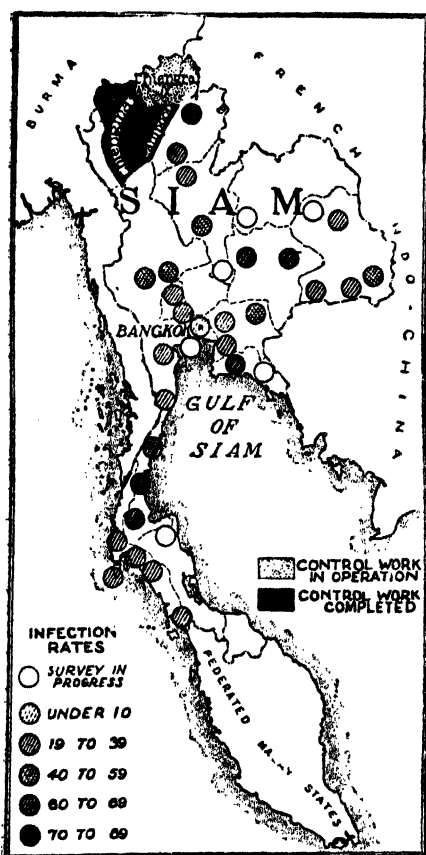


FIG. 28.—Map of Siam showing progress of hookworm survey and control campaign at the close of 1922.

[Reproduced from the 9th Ann. Rep. International Health Board, 1922.]

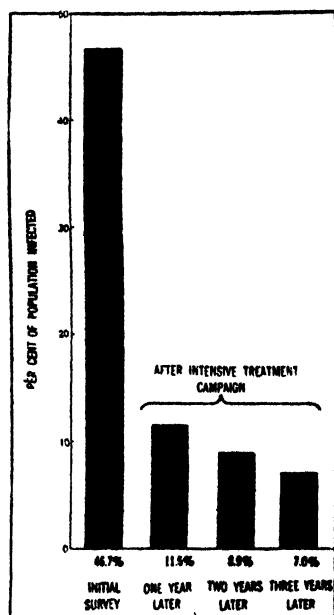


FIG. 29.—Diagram illustrating reduction in hookworm infection rates on four estates in the Vere area, Jamaica, resulting from treatment campaigns.

"The drug is palatable, making it less difficult to induce patients to accept treatment than the other remedies. Its definite chemical composition makes it preferable to compound drugs of herbaceous origin. Moreover, apart from the economy it effects through the ease and cheapness of its administration, the drug itself is considerably less expensive than either thymol or chenopodium.

"In Ceylon it was given to a number of children who had previously been treated with oil of chenopodium on one or more occasions, with

the result that it removed all or a large proportion of the worms that had remained after chenopodium treatment. It may also, apparently, be safely given in pregnancy, when other remedies are contraindicated.

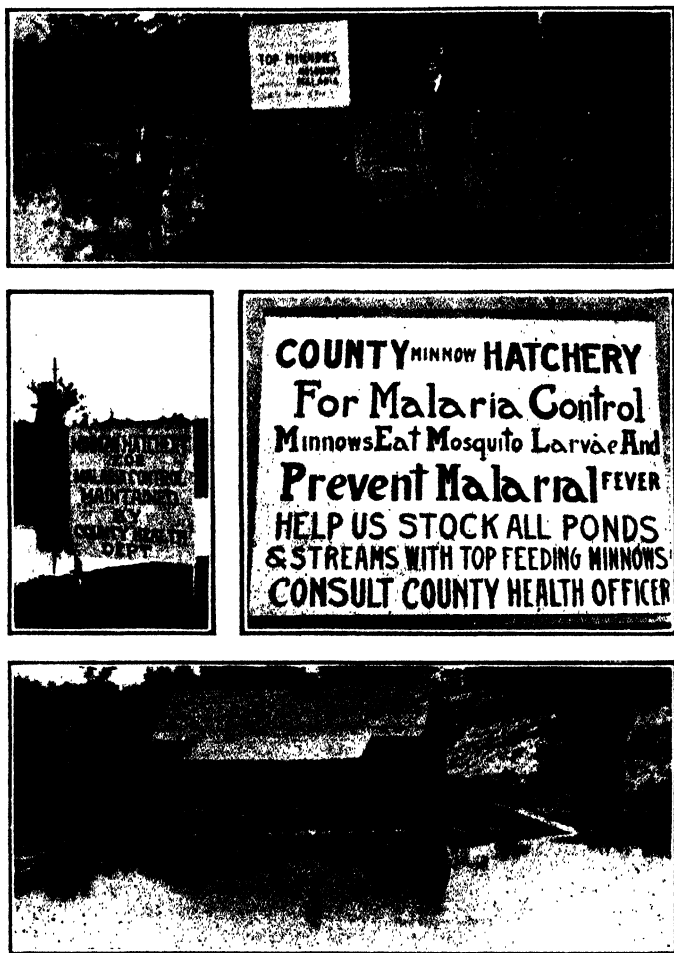


Fig. 30.—Minnow hatcheries maintained by county health departments are now a common sight along the highways of many southern states in America. *Top*: in Houston County, Alabama, U.S.A.; *Centre right*: road signs like this appear in many parts of Texas; *Centre left*: hatchery in Florence, Alabama; *Bottom*: top minnow hatchery in Yazoo County, Mississippi.

[Reproduced from the 9th Ann. Rep. International Health Board.]

In Fiji hundreds of pregnant women have been treated with carbon tetrachloride without a single reported case of abortion, and in Ceylon a number of anaemic and emaciated children who had fever from various causes were treated with excellent results."

UNITED STATES PUBLIC HEALTH SERVICE. Treasury Dept. Public Health Bull. No. 104. 1919. Oct. 179 pp. With 27 figs. [59 refs.]—**Transactions of the First Annual Conference of Sanitary Engineers and Other Officers of the Public Health Service directing Antimalaria Campaign. Held at Wilmington, N.C. Feb. 17-20. 1919.**

An account of the Second Annual Conference was given in the last number (p. 2). The publication consists of a series of papers on the

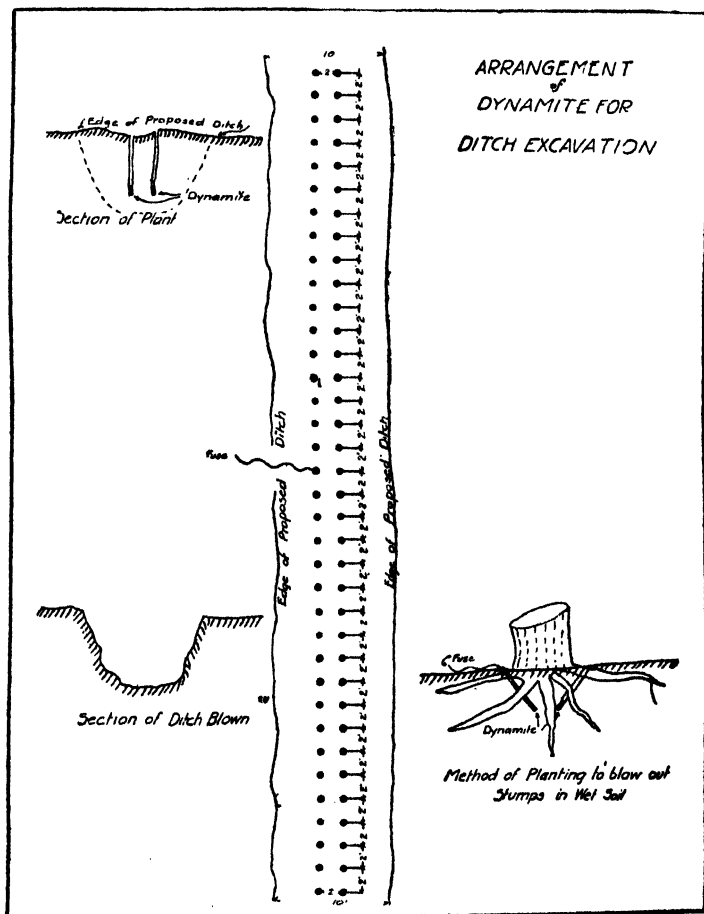


FIG. 31.—Arrangement of dynamite for ditch excavation and for blowing up of tree stumps in wet soil. For ditch excavation straight 40 per cent. or 60 per cent. dynamite is placed in two rows of holes, made with a shovel handle or round stick, about 2 ft. apart and from 3 to 4 ft. deep, in sections up to 150 ft. One stick of dynamite ordinarily is placed in each hole, a detonating cap and fuse being attached to one of the sticks near the middle of the section. In wet soil the concussion from the explosion of this stick usually suffices to set off all the other sticks in the section and a ditch from 6 to 12 ft. wide and 4 to 8 ft. deep, depending on the soil and the skill of the blaster, is formed. After the section blasted has had time to dry out a small gang of men clears the debris and rakes out loose mud, etc. The method does not work satisfactorily in dry ground.

[Reproduced from *Public Health Bulletin*, No. 104, U.S. Public Health Service, Washington.]

subject of malaria prevention and the discussions which resulted from them. Owing to its length it is quite impossible to do it justice within the space of a review. Papers on the following subjects were read :—

Screening of residences ; railroad malaria problems ; tide gates ; subaqueous saws ; vertical drainage ; flight of anopheles ; rice field control measures ; hibernation ; fish control ; pond control ; oiling ; the use of dynamite in malaria control operations, etc.

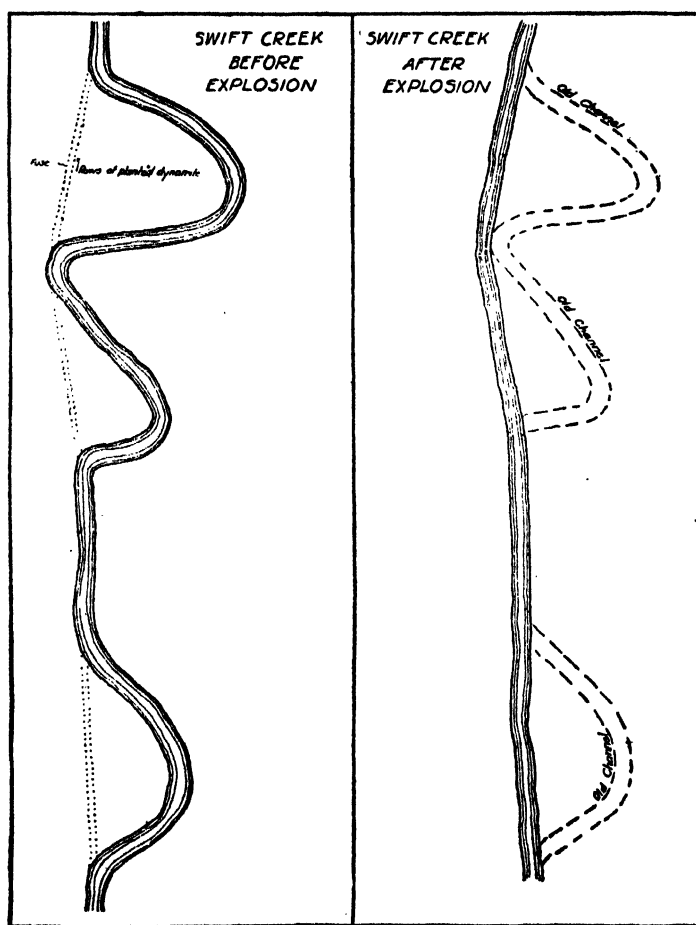
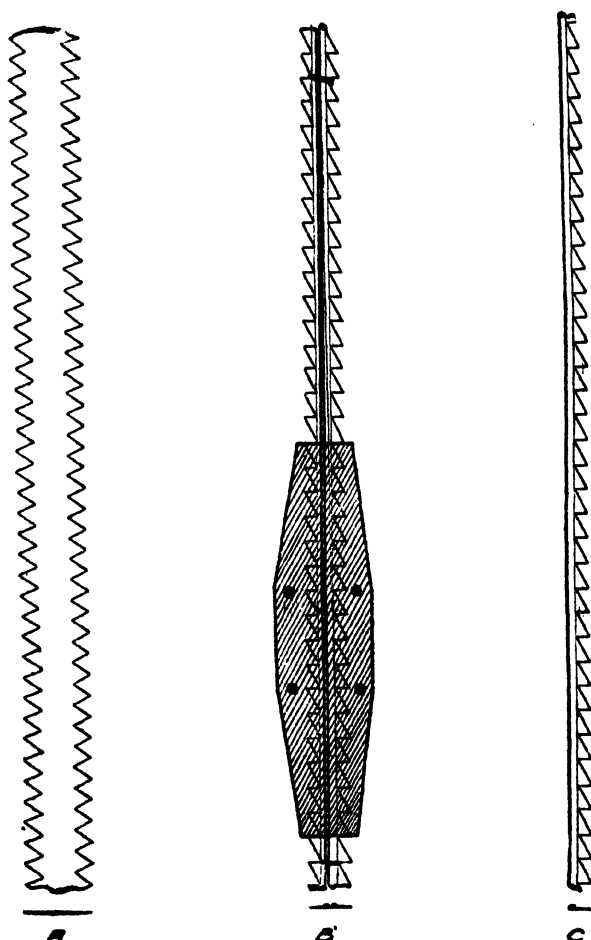


FIG. 32.—Dynamite used to straighten and deepen channel of Swift Creek. The stream, which averaged about 20 ft. wide and from 1 to 6 ft. deep, and had an extremely tortuous course, giving rise to pools and backwaters, was straightened over a length of 4,540 ft. at a cost per linear foot of \$0.334.

[Reproduced from *Public Health Bulletin*, No. 104, U.S. Public Health Service, Washington.]

All of these are of very great importance and deserving of the attention of all sanitary officers in tropical countries, but the methods applicable to the southern states of America are not always applicable to more primitive countries.





A - AERSHOT BROS. SAW  
 B - IMPROVISED SAW FROM "LICKER-IN WIRE"  
 C - "LICKER-IN WIRE"

ACTUAL SIZE

FIG. 33.—Subaqueous saws used for clearing aquatic vegetation from the beds of lakes.

A. Double-edged saw manufactured by Aershot Bros., costing about 30 cents per foot. The saw blade is twisted in the form of a spiral making it more effective in cutting.

B. Improvised subaqueous saw made by tying the hilts of two "licker-in" wires back to back at intervals of 8 or 10 ins. The saw is weighted by cast-iron tubes 4 in. long slipped over it at intervals of 4 ft., to allow it to take the contour of the lake bed. It is used in lengths of 100 ft. and 50 ft., with ropes tied to each end.

C. "Licker-in" wire as used in the combing process at cotton mills. It costs about 30 cents a pound, which averages  $2\frac{1}{2}$  cents per ft. The steel is not well tempered, but in long lengths and made into an improvised saw [see B above] provides a substitute for the more costly subaqueous saws on the market.

[Reproduced from *Public Health Bulletin*, No. 104, U.S. Public Health Service, Washington.]

We reproduce some interesting figures (Figs. 31, 32 and 33), which is probably the best way of reviewing the work within the space at disposal, and a few extracts.

It is estimated by Assistant Surgeon General H. R. CARTER that 60 per cent. of the malaria of the United States is man made.

Concerning fish control, in many places it has been found necessary to remove larger fish before adding *Gambusia*. This is best done with a charge of dynamite. *Gambusia* themselves are sometimes caught by local fishermen as bait; this obviously must be remedied. As a result of experiments in Augusta it was found that fish work satisfactorily in much denser vegetation than was presumed. It is not always necessary to clear out all the weeds.

In Augusta Mr. WAGENHALS found (a) fish control a valuable, economic and efficient method; (b) that certain factors entered into the efficiency of this method. "For example, a large pond requires a great many more fish than a small pond. Do not expect a half-dozen fish to control a mile of pond edge. If vegetation is present a larger number of minnows will be required than if the edges are ideal for their operation. If game fish are abundant, a larger number of minnows are necessary than if there are but a few of the game fish present; by removing the large fish, the number of top minnows can be correspondingly decreased."

Oiling, control of drainage, etc., were primarily conducted in the water, not in the rice fields themselves. Here it was found by observation that the oiling tended to pool in certain places and killed the rice that was sprayed on, but the use of sawdust reduced the breeding and did not affect the rice. *Gambusia* being equally distributed over the plots tended to collect in the more open water and leave the parts where the growth of the rice was densest. Intermittent watering was found to be unsatisfactory, as it only removed the larvae to another place and injured the rice crop.

Surgeon General CARTER, criticizing one of the papers, stated that in some rice field control measures the effect of an attempt to control the production of mosquitoes by drainage and oiling had been negligible. Screening is a factor in preventing the spread of the disease, but he placed the greatest reliance on eliminating the malaria carrier in the population (which is usually scanty) in rice-growing areas.

A subaqueous saw is an instrument used for cutting vegetation. It is made of a flexible steel and can be used up to a length of 200 to 400 feet.

UNITED STATES PUBLIC HEALTH SERVICE. Treasury Department.  
Public Health Bulletin No. 125. 1922. Sept. pp. vi+193.  
With 8 figs.—**Transactions of the Third Annual Conference of Malaria Field Workers. Held at Hot Springs, Arkansas, November 15-17, 1921.**

This bulletin is the third issued by the Conference of Malarial Officers sitting at Hot Springs, Arkansas. The volume extends over close on 200 pages, and, like the former, gives a verbatim account of the discussion of the several papers. This is not only very interesting reading but considerably enhances its value.

The bulletin deals with such subjects as the "use of arsenic as a larvicide for anopheline larvae," by Dr. M. A. BARBER; "The use of

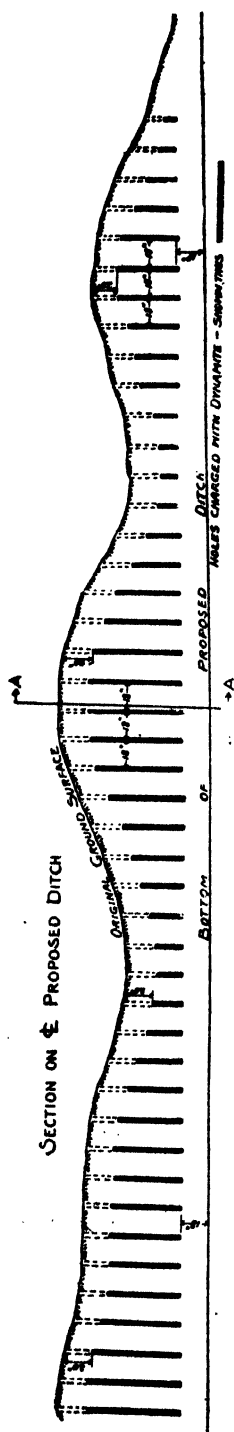


FIG. 34.—Profile showing method of placing dynamite for blasting ditches. Only one line of dynamite was used loaded down to 18 in. of the proposed bottom of the ditch and to within 18 in. of the top of the ground.  $1\frac{1}{4}$  in. octagon-shape steel bars were used for making the holes: as each bar was withdrawn the hole was immediately loaded to prevent access of sand, using a tamping stick to pound down the dynamite. Notches on the tamping stick provided a convenient measure for securing uniformity of loading.

[Reproduced from *Public Health Bulletin*, No. 125, U.S. Public Health Service, Washington.]

dynamite and T.N.T. in blasting ditches," by J. L. CLARKE ; "Effect of drainage districts on the control of malaria in the Mississippi delta," L. L. HIDINGER ; "Seasonal incidence of malaria with special reference to transmission," by Dr. C. BASS ; "Economic losses from malaria," by A. W. FUCHS and others.

As regards the first paper we have already referred to the use of trioxymethylene and Paris green for destroying anopheline larvae. The latter is an arsenical compound and is mixed with ordinary road dust and sprinkled by hand over the surface of ponds. 10 cc. mixed with about a quart of fine sand is adequate for 4,000 sq. ft. of water surface. The material costs 22 cents a pound in New York and is packed in 300-lb. barrels. It is found to be extremely deadly to the larvae of mosquitoes and is not added in sufficient quantities, the author says, to render the water poisonous to animals.

A paper by J. L. CLARKE on "Blasting ditches" gives the whole of the technique, including the cost, in that part of the world. The diagram (Fig. 34) gives some idea of the method. We regret that we cannot give more space to this very interesting brochure, but recommend malarial officers to obtain copies for themselves.

FERGUSON (HARRY F.). [**Une campagne contre les moustiques dans l'Illinois (États-Unis d'Amérique).**]—*The Engineer*. 1923. May 4. Vol. 135. No. 3514. p. 482. [Summarized in *Bull. Office Internat. d'Hyg. Publique*. 1924. Feb. Vol. 16. No. 2. pp. 231-232. [1 ref.]]

The writer gives an account of the malaria in the town of Carbondale, situated in the County of Jackson, Illinois, considering both the financial loss occasioned by malaria and the measures for its removal. He estimates that 3,000 cases which formerly occurred in the town caused the loss of about £20 per head, so that the estimated economic loss is between £50,000 and £60,000 a year. In the spring of 1922 the Municipal Council organized a campaign against the disease. Assistance was forthcoming from the sanitary engineer from the State. A study of the surrounding country showed that the breeding places were in a zone of about 60 acres of marsh to the north of the town and a lake of 40 acres to the south, some small ponds and a large number of storage cisterns for rainwater. The Central Illinois Railway drained the marsh by a ditch about 2 miles long, dug in the American way by the use of dynamite. This rapidly improved the situation, and the town lake, which was covered on the edge with vegetation, was lowered 18 in. Petrol and oil were used for cleaning the banks. Of 664 rainwater reservoirs nearly 400 were reproducing mosquitoes. These were cleansed and the minnow *Gambusia* added. The total cost was about £850.

KLIGLER (I. J.) & WEITZMANN (I.). **Malaria Control Demonstrations in Palestine. Report on Malaria Control Demonstrations of the Hadassah Medical Organisation.**—75 pp. With 6 figs., 1 map & 2 charts. 1922. Jerusalem: Printed by the Jerusalem Printing Works Ltd.

The work described in this report has been alluded to in this Supplement under the head of the "Minutes of the Palestine Anti-malarial Committee." (See *infra*, p. 81.)

"The places selected for the demonstrations were Migdal, Kinneret and neighbouring settlements, Menahemia, Yabniel and later Um-Ul-Alek. The first four places are in Lower Galilee, fairly near to one another, and readily accessible—matters of great importance for administrative purposes. The place last named is in Samaria, and was selected as a type of an isolated Kewuzah with a high malaria incidence. . . .

"The three important points tested were :—

"1. Degree of malaria reduction obtained by the combination of (a) treatment of carriers, (b) anti-mosquito measures, and (c) quinine prophylaxis. This demonstration was carried on in Migdal and Kinneret.

"2. The protective effect of (a) treatment of carriers, and (b) anti-mosquito work (without quinine prophylaxis). This experiment was made in Yabniel.

"3. The protective value of (a) treatment of carriers, and (b) prophylactic quinine (without extensive anti-mosquito measures). This was done in Menahemia and Um-Ul-Alek, but since the mosquito problem in both places proved to be small, this experiment has little value in establishing the effect of prophylaxis as a single control measure in a campaign against malaria."

Careful description of the various places is given in the report and much valuable detail of the procedure adopted, particularly in the cost of oiling, etc.

"Only two species of anopheles were observed in this area and their prevalence varied with the season. In April *A. maculipennis* and *A. palestinensis* were found; throughout the summer months only *A. palestinensis* was observed; at the end of October the *A. maculipennis* re-appeared. The *A. maculipennis* is evidently a spring and fall species, while the *A. palestinensis* is pre-eminently the summer variety."

In nearly all of the above series the population appears to have been so small that it must be extremely difficult to be sure of the correctness of the conclusions. For instance, in the Migdal control area, exclusive of Migdal, the population is only 350 individuals, 60 living in rooms on a farm, 15 Arabs living in tents just east of the farm, and about 250 labourers working on a road living in tents. The population fluctuated considerably during the investigation, and this must obviously have largely vitiated the conclusions.

The total cost of operations at Migdal, including the cost of cleaning and repairing the canal, is indicated below :—

					£E.
Part of salary of sanitarian	...	...	...	...	82.60
Petroleum	...	...	...	...	22.80
Crude Oil	...	...	...	...	3.50
Incidental Expenses	...	...	...	...	25.00
Ditching and Cleaning Canals...	...	...	...	...	20.00
Total cost of Mosquito Control					£E.153.90

In discussing the results the writers consider that in all places reduction of about 80 to 90 per cent. of malaria was obtained, and, an interesting conclusion, find that the significance of natural swamps is small compared with the artificial breeding places. First in order of importance are the breeding places arising from man's carelessness and the general neglected condition of the country; the irrigation

systems are more trouble and much more deadly than the swamps. The remedies for the malaria situation in Palestine are, briefly:—

“(1) The co-operation of the various settlements in the cleaning of their respective long-neglected and consequently overgrown wadis. Once properly cleaned and regulated, these wadis could be kept under control at very little expense.

“(2) The improvement and control of the method of irrigation. The simplest solution for this problem is the method of intermittent irrigation, as carried out in Migdal. The season of malaria epidemics coincides with the period of most active irrigation, and both at Migdal and Kinneret the primitive system of irrigation employed by most farmers gave the greatest amount of trouble.

“(3) The gradual drainage of the swamps resulting from overflowing springs, etc., by the inhabitants in co-operation with other agencies. At comparatively little cost for labour help, the anti-malaria inspector in each of the places under control succeeded during the first year in draining small but important swampy areas.

“(4) The constant supervision of all these places to protect the inhabitants against their own negligence and indifference, and inculcate the habit of proper self-care. Education is as important in malaria control as in other phases of Public Health Work.”

The writers consider that the best petrolizing fluid was a crude oil-petroleum mixture which consisted of one part crude oil and four parts petroleum. When 0.1 per cent. of castor oil is added the film has uniform resistance and is approximately twice as large as that given by the crude oil mixture alone. Castor oil added to petroleum gives a film 10 times as large as that of petroleum, but it is not homogeneous and is readily destroyed. It would seem, therefore, that the 1 : 4 mixture of crude oil and 0.1 per cent. of castor oil is the best for all purposes.

**PALESTINE. Proceedings of the Eighth Meeting of the Anti-malarial Advisory Commission, 22nd November, 1923.** [HERON (G. W.), Director of Health, President.] [MS. received from Dept. of Health, Jerusalem.]

As usual, these minutes are of very great interest. The department had a trying time owing to the necessity for rigid economy in expenditure. Much of the matter discussed at the meeting was naturally of very local importance. The following extracts, however, are of general interest.

“Dr. Kligler read a report on the ‘Infectivity of Palestinian Mosquitoes.’

“He said there were eight species of *Anopheles* in Palestine, six of which were house visitors and consequently potential malaria carriers. There were also epidemiologic indications that some of these species were of greater and others of less significance. It was a matter of practical importance to know the relative significance of the various species of *Anopheles* as malaria vectors. There were many swamps which bred only *A. elutus* (*maculipennis*), others which bred only *A. superpictus* (*palestinensis*) and still others which bred chiefly *A. sergentii* or *A. multicolor*. If some of these mosquitoes were of greater importance as carriers of malaria parasites than others, the extent and cost of control might be reduced considerably without affecting its efficiency . . . . .

" Experimental infection of mosquitoes had been attempted. Five feeding experiments had thus far been carried out—four with *A. elutus* and one with *A. sergenti*. In each case the mosquitoes received only one feed of infected blood. One feeding experiment with *A. elutus* was on a patient with benign tertian gametes who had received quinine one day prior to the feeding. None of the mosquitoes became infected. The other experiments with *A. elutus* were with malignant tertian gametes. In two instances the patient had received quinine two days and a few hours respectively before the feeding and the results were negative. In the third experiment the patient had not received quinine for three and a half days prior to the feeding and 75 per cent. of the mosquitoes surviving seven days or longer were infected.

" The experiment with *A. sergenti* was also with malignant tertian gametes. The patient had received quinine 36 hours before feeding. The results were negative.

" The results of these feeding experiments indicated (1) that *A. elutus* was a carrier of malignant tertian parasites contrary to the assumption recently made by Buxton. (2) That neither *A. elutus* nor *A. sergenti* were infected by a single feeding on patients who had received quinine within 48 hours prior to the feeding. This applied to benign as well as malignant tertian parasites.

" With regard to infected mosquitoes in nature, the dissections carried out thus far were of interest. Most of them were made during the months of October and November. Up to the present about 175 *A. sergenti* (chiefly from Bet Alfa) have been dissected, and 75 *A. elutus* (from Benjamina). The *A. sergenti* were all free from infection while one of the *A. elutus* had definitely developed cysts.

" *A. elutus* might, therefore, be considered, even after these preliminary experiments, as an important vector of malaria in Palestine.

" Dr. Kligler emphasized that this was only a preliminary report and that the experiments were being continued."

Dr. SHAPIRO's note on Paris green :—

" In his tests he followed the method of Barber. He used 10 gm. of Paris green for 100 square metres of swampy areas. The Paris green was diluted with fine road dust or with fine sand, if dust was not available, in the proportion of one to 100 and mixed very thoroughly. The method of dusting the mixture varied with the kind of place to be dealt with. In open pools covered with algae, scattering in the direction of the wind was quite sufficient; but in places where in addition to horizontal there was also low or tall vertical vegetation, better results were obtained when the vegetation was very tall with puddles of water in it. Usually one learnt after a little experience just how far the powder was carried after it was thrown. One could actually see green particles on the surface of the water.

" Paris green did not affect pupae nor ova. 12-14 hours after the use of Paris green he found pupae and first stage larvae alive. Paris green was, therefore, used at intervals of not longer than seven days.

" The cost of Paris green was about Pt.22 per kilo c.i.f. Jaffa. 100 gm. were sufficient for 1,000 square metres and cost 22 milliemes. In using paraffin for the same area 10 litres were needed and cost about Pt.13. Thus Paris green was at least five times as cheap besides being more effective for certain kinds of swamps . . . .

" The use of Paris green had been of distinct help in their work. With regard to the danger of using Paris green they had not noticed

any harmful effect. If the spreading was done to windward and the hands were washed free from any particles there would be no danger to the operator. Barber insisted that because of the small amount of diluted poison spread and because of the fact that only a very small fraction of the compound was water-soluble, the danger of poisoning animals drinking treated water was small.

"The analysis of Paris green at the Government Laboratory, Jerusalem, showed that it contains 2.2 per cent. of arsenic soluble in water. A few samples of treated water taken on the 2nd or 3rd day after Paris green was used were also analysed. The surface water in one sample contained 2.5 parts per million of arsenic and 0.4 and 0.5 of one part per million in two others. One sample of treated water taken from the depth of the pool gave five parts per million while another also taken from depth gave only 0.5 parts per million.

"He had used Paris green in wadies and pools, some of which were frequented by cattle, but he had not met with any indication of trouble. Once he noticed dead tadpoles on the day following the use of Paris green. The surface feeding fish were not affected by Paris green, nor were culicines (which feed below the surface)."

CHRISTOPHERS (S. R.). **Enquiry on Malaria, Blackwater Fever and Anchylostomiasis in Singhbhum. Report No. 1. Preliminary Investigation into the Conditions on the Bengal Iron Company's Mines at Manharpur, January, 1923.**—37 pp. With 6 maps & 4 figs. 1923. Patna: Supt. Govt. Printing, Bihar and Orissa.

This report is one of the most valuable in the domain of malaria investigation that has come to hand. Situated in the somewhat remote part of Singhbhum are three separate mining camps worked by the Bengal Iron Company. The labour employed in these camps has always suffered from malaria to a greater or less extent. Col. Christophers visited them, made a careful investigation of the locality, and collected a mass of very valuable information. The report itself is so condensed that it is extremely difficult to make an intelligent attempt at reviewing it. We recommend that all interested in the subject of malaria investigation and anti-malarial measures should obtain a copy and use it as a model whenever investigations of this nature are in progress. The more important features are given below:—

**Malaria Infection in Children.**—Among the 18 children of age 1–2 resident on the estate for at least 12 months the average parasite value was 12,084, and the infections encountered ranged from 83,000 to 140 parasites.

"Assuming that each child had the same history as regards cycles of parasites as the others we may for the purpose of illustration make the following approximate estimate of what an individual child passes through. As 18 children examined at random at a given time had five infections of over 10,000 parasites per c.m., one child of these 18 is likely in 18 days, on the average, to have five such infections. Similarly for 13 out of the 18 days it ought to have over 1,000 parasites per c.m. and no day without parasites.

"The significance of the above findings is further appreciated when it is considered that, as a result of counts of parasites in attacks among seamen, Ross and Thomson (1910) fixed 200–500 in the case of *P. vivax* and 600–1,500 in the case of *P. falciparum* as the number of parasites per c.m. required to cause fever. From counts given by these authors.



it would seem that from 3,000-4,000 parasites per c.m. were invariably associated with an attack, and a temperature rising to 103°F. or over. Taking even 5,000 parasites per c.m. as a convenient test number for an infection sufficient to cause an attack, each of these children must be considered as under 'attack' conditions in respect to the number of parasites in their blood on 8 out of 18 days at least. Not only so, but the number of parasites would represent attacks of some severity. The highest count in the series is only once exceeded in Ross and Thomson's figures, and out of 30 attacks in the seamen, only 8 are as high as the next four higher in the children. This degree of infection, also, was not during the fever season when one might suspect it to be temporary, but at a time when malaria transmission was probably least active.

"There seems little doubt therefore that *this intense infection, that can only be described as continuous attack, with an average parasite count of over 10,000 parasites per c.m., and lasting something like two years, is an essential feature of hyper-endemic conditions.* I shall call it the stage of *acute infestation.*

"It is extraordinary to consider that a small baby should be able to pass successfully through a two-year-long attack of malignant tertian, which is what such a stage amounts to.

"In children of age 2-5, who have been resident on the estate for at least three years, the proportion infected is still as high as ever, but the average value of the infections is now altogether different, for the average number of parasites is now only 1,200 per c.m., and the highest infection encountered one of 5,420 parasites per c.m. For the sake of illustration we may say that at this stage the child now only has an attack state about once in 25 days.

"Through age period 6-10, among those who have passed through the ordeal of acute infestation, the numerical value of infections was under 1,000 per c.m., though the actual infection rate was still approximately 100 per cent. The period following acute infestation and lasting through childhood to adolescence we may call the stage of *immune infestation.*

"In the case of children (under the age of six) who came into the camps at some subsequent age to birth, the period of acute infestation appears to have been the first two years of residence. Twenty children of age 3-5 of under two years' residence showed an average parasite value of 14,343 whilst 25 children of the same age with over two years' residence showed an average of 1,320. We may presume then that immigrant children, if not already immune, commence their period of two years' malarial apprenticeship in the stage of acute infestation at whatever age they enter the area . . . .

"The net result of childhood passed under hyper-endemic conditions is the acquirement of a form of immunity. It is probable that immunisation is produced not by infections and attacks scattered through the age of childhood, as I think has generally been supposed, but by a period of terrific parasitic infestation lasting some two years, followed by a changed state in which parasites are still to be found, but in small numbers. The period of acute infestation should normally start shortly after birth, but in the case of immigrants may commence at a later age.

"Associated with the period of acute infestation is a spleen of moderate size (4-6 cms.). Further increase in the size of the spleen is more associated with the period of low numerical prevalence of

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\* A figure has apparently dropped out here.

parasites. This period of low numerical parasitic prevalence has a very significant resemblance to the so called 'salting' of animals in trypanosomiasis. It will be of interest to follow the further course of events into adult life . . . . .

" Nothing has been said about the occurrence of sexual forms of the parasite. In all 37 out of the 208 children examined showed crescents. The numerical value of the 37 crescent infections was not high, the highest infection encountered being 392 per c.m. and the average 57 per c.m. Darling gives 12 per c.m. as necessary to infect the mosquito, and as this number would usually be detected in the examinations made, the 37 cases should represent the number of carriers. These, it will be noted, at this time of the year form only about 18 per cent. of the whole.

" The cases in which crescents were found in the children gave an average of 6,154 parasites per c.m. and five of the infections were over 10,000 per c.m. Crescent formation was therefore associated with the large rather than the small infections. Twenty-two of the 37 children in which crescents occurred were under two years' residence, and 13 in children of 3-6. Crescents were therefore more characteristic of the period of acute infestation. Collectively there were 2,095 crescents (taking only cases in which crescents were found) to 227,696 asexual parasites or 1 to 108. But if the whole child community be considered the number of crescents would be 1 to 390 . . . . .

" Malaria Infection in Adults—Taken collectively the percentage infected among adults was 49, and the average parasite value 122. The number of infections over 5,000 per c.m. was nil, and there were only five infections of 1,000 per c.m. or over. Only one infection (4,040) approached what we have previously taken as 'attack' condition, and we may say that at this time of the year an adult, on the average, would seem to have an attack only about once in 158 days (five months). *This peculiar relationship of low value of infection and high percentage infected must represent immunity in the adult.* A European living without any protection, as most of these men do, in the midst of infection would undoubtedly suffer much more severely.

" Considering the history of malarial infection among those living in this hyper-endemic area, from birth to adult life, the following sequence is observable.

Stage.	Age and residence in years.	Spleen rate.	Per cent. infected.	Average parasites.	Frequency of attack.
Acute infection..	1-2	75	100	12,629	Almost continuous
Immune					
infestation	3-5	88	96	1,320	Once in 25 days
" "	6-12	71	86	1,018	Once a month
" "	12-16	46	50	198	Once a month
" "	Adult	11	50	122	Once in 6 months

" We may epitomise the conclusions in this section by saying that under conditions which to the newcoming child means intense, almost continuous heavy infection, the adult lives infected, but without suffering illness. It is necessary to remember, however, that the conditions here dealt with refer to the non-fever season. There is some reason to believe that in malaria immunity is relative, *i.e.*, that

the amount of infection displayed is to some extent dependent on the amount of infection to which the 'salted' adult is exposed. With increased dosage of infection the average parasite value of the community may be raised and appreciable attacks become more frequent and the labour force may then appear to their employers to be suffering unduly from fever. The mechanism would appear, however, to be an entirely different one from the occurrence of an epidemic among a non-immune community, and the practical difference will probably lie in the fact that whilst the 'salted' population are perhaps liable in the fever season to occasional attacks of sickness, an unsalted population in the same conditions would be completely incapacitated. There can be no doubt that in weighing up the advisability of action against malaria a reasonable allowance must be made for the fact that a 'salted' labour force is not in the same urgent need of protection that a 'non-immune' one would be."

Recommendations.

"(1) Certain anti-malaria measures are urgently called for; these are:—

"(a) Rectification of the conditions in the large excavated area at Manharpur. A proper outfall for drainage of the floor should be provided and the necessary filling in and digging of drains to ensure that pools do not form undertaken.

"(b) The wet rice-land near the Manager's bungalow at Manharpur should be acquired and sub-soil drained.

"(c) It would be for consideration whether such action as is suggested in regard to the ravine at Manharpur could be carried out, possibly with assistance from Government as it would be to some extent an experimental measure likely to yield information of importance to the province generally.

"(d) The herring-bone drains through the seepage area at Chiria would be better converted into sub-soil drains. Some information regarding this type of work as carried out in the Federated Malay States taken from an article by Lieutenant-Colonel Harvey, I.M.S., and the author in the *Indian Journal of Medical Research* (Vol. x, no. 3, p. 759) is attached as an appendix.

"(2) The labour now employed is one acclimatised and relatively immunised to malaria. I do not therefore at this stage recommend any costly anti-malarial work with a view to its protection, beyond that given above.

"(3) Attention should be given to the position of the skilled labour quarters. These would be better re-erected further up the hill slope, as even if the excavation is made innocuous, the present quarters are too close to the ravine and the bed of the Koina. If the enquiry is to be continued, as I recommend it should, it might be well to wait for further information as to the most suitable situation to be adopted.

"(4) Existing European bungalows should be well and suitably screened. Any new bungalows should be erected in selected situations, after due enquiry has shown what such situations should be.

"(5) The use of quinine should be encouraged and possibly during the fever season benefit might be obtained from a regular issue to workers, but such action is only advised where a great deal of sickness from fever appears to be about. All should be encouraged to ask for the drug when suffering from fever. A dose of ten grains for an adult or five for a small child should be given at a time and repeated at request. Tabloids are the most convenient form but should be from

a thoroughly reliable firm, and the order should be given for them to be crushed in a little water when taken.

"(6) Europeans should be provided with instructions regarding methods of personal protection and encouraged to improve on such. They should also be instructed regarding treatment of fever.

"(7) The Buda scheme should be carried out if practicable. But it would be desirable to commence with a temporary camp in which the conditions after occupation for some time could be investigated.

"(8) Cases of severe anaemia in the labour are likely to be due to anchylostomiasis and should receive thymol treatment. It is recognised that there are grave difficulties in an attempt to introduce conservancy, but in the case of certain lines it might be tried whether a suitable type of latrine with an incinerator would not be used if it were erected *near the lines*, made of a type that met with the coolies' approval and well tended and supervised.

"(9) Further enquiry is necessary for practical results. Above all, information is required as to the nature of breeding places during the rains and the extent to which anopheles then disseminate themselves from the streams. Further enquiry on anchylostomiasis in the camps should also be undertaken."

MANGOEWINOTO (R. M. M.). **Sanitation of the Tjihea-Plain.**—*Meded. Burgerlijk. Geneesk. Dienst. in Nederl.-Indië*. 1923. Pt. 3. pp. 236-274. With 4 figs., 5 charts & 1 map. [2 refs.]

The state of affairs of which the writer gives a very interesting account in many ways resembles what occurred in the Canal Colonies in the Punjab in India.

A valuable piece of country known as Tjihea plain in the Dutch East Indies was only irrigated to the extent of about 300 bahu (about 525 acres). In 1865 an enterprising local Rajah desired to irrigate the whole of the plain from a neighbouring river. A certain amount of work was carried out, but without skilled advice, and as a result of these somewhat primitive methods about 500 bahu were brought into irrigation. The Government took over the matter later on, and at the cost of 5,000,000 guilders and 15 years' toil the irrigation plan was carried out.

The water was first available in 1904; considerable increase of the population resulted, and the first year's crop was naturally a great success. Distribution of water left a great deal to be desired, and the people went on growing crop after crop until the fertility of the soil was greatly reduced. Owing to the careless methods of irrigation malaria became extremely rife. The canals were always full of water, and consequently the edges became overgrown with vegetation, the drying up of the paddy land was never properly carried out, and this brought with it its own result, in that malaria-carrying mosquitoes increased enormously, and the disease became so prevalent that the population declined. A vicious circle resulted, and much paddy land was left fallow or more or less submerged.

Several medical officers visited this part of the country and made investigations into the cause of this state of affairs. The authorities described the area as follows:—

" 'Many fallow, ill kept, inundated sawah's, where the marshy flora is luxuriantly pushing, gardens and fish ponds ill kept, besides there are still several lakes, the whole resembles one large marsh'; this

condition was imputed to the fact that more water was supplied than was carried off."

The writer went to the plain shortly after, in 1918 or 1919. The estimation of the spleen index of 4 subdivisions of the plain showed that in two the index was over 80 per cent., in one it was 64, and in the other 75. The amount of fallow paddy land had gone up considerably, so that in 1917 there was 15,000 bahu unattended. Recommendations had been made for the use of mosquito nets; these had never been treated seriously by the natives, who looked on them as ornaments. The people looked anaemic and the children had large and swollen abdomens. The mortality rate of 1917 is given as 32.4 per cent. This rate appears to have remained stationary after about 1914, but there is no doubt that many sick left the country without being replaced by immigrants. A very careful survey of the spleen index and the parasite index of the district was carried out, and, as is usual, it appeared that at about the age of 15 years the parasite rate showed a very rapid decline. The mosquitoes found in the area were of several different varieties, but *Myzomyia aconita* as the important carrier of malaria and the true house mosquito was largely the cause of the malaria present. This variety was particularly to be found in inundated paddy land and the vegetation which bordered the irrigation canals.

Remedial measures were suggested and commenced by the writer. These consisted of:—

"1. Laying absolutely dry the planted sawah's, after the rice having been cut, and the fallow sawah's.

"2. Planting the sawah's simultaneously.

"3. Cleaning the ditches, which contain water.

"4. Quininization of the population, as acute recrudescences of the epidemic appear."

The author has not a very great opinion of quininization in an oriental population, on account of the difficulty of making it thorough, but the measures Nos. 1, 2 and 3 were of vital importance to the whole of the district. Further investigations at a subsequent date showed that the recommendations were producing a satisfactory amelioration of the conditions in the population.

As is pointed out, "the watchword will remain: keep your ditches clean; lay dry your sawahs immediately after the rice has been cut."

The writer also investigated such interesting points as the flight of the *A. aconita* and also the usefulness or otherwise of placing buffalo stables in close proximity to human habitations. He does not believe that under the conditions present on the Tjihea this measure is of much use.

HEYDON (G. M.). **Malaria at Rabaul.**—*Health*. Melbourne. 1923. Nov. Vol. 1. No. 9. pp. 249-254. With 4 figs.

This small town is situated in the island of New Britain,  $4\frac{1}{2}$  degrees south of the Equator. It has a population of about 350 whites with 1,000 Asiatics and 1,500 natives. Malaria here appears to be carried by *Anopheles punctulatus*, which breeds in natural waters such as pools, ditches, swamps, but not in tanks, roof gutters, cut bamboos, empty tins, etc., nor in the water in the leaf axils of the banana plant. Its numbers are not great in the town, but there is no doubt from dissection that this is the carrier. Out of 136 specimens caught in

native quarters 6·4 per cent. contained sporozoites and 6·2 oocysts. Preventive measures followed the usual lines, such as drainage, oiling, etc.

LEGER (M.) & BÉDIER (E.). **Résultats d'un essai de prophylaxie quinique du paludisme dans les écoles de Dakar.**—*Bull. Soc. Path. Exot.* 1924. Jan. 9. Vol. 17. No. 1. pp. 101–102. [1 ref.]

The writer gives an interesting account of an attempt to reduce the number of parasite bearers in school children in Dakar. A dose of ·25 gms. of quinine hydrochloride was given to each child 3 days a week between the months of October 1922 and July 1923, this being the most malarious season. Before treatment, out of 210 children examined, the parasitic index was :—

	Dakar.	Medina.
In children under 10 years of age ...	43·7	63·6
In children over 10 years of age ...	30	59·6

At the conclusion of this treatment the following diminution in the parasite rate was obtained (103 children). It appears to be decidedly encouraging :—

	Dakar.	Medina.
Children under 10 years of age ...	23	22·7
Children over 10 years of age ...	22·2	21

OBERLÉ & VIALATTE (Ch.). **Paludisme et lutte antipaludique dans les troupes d'occupation du Maroc.**—*Arch. Méd. et Pharm. Milit.* 1923. Nov. Vol. 79. No. 5. pp. 700–728. With 2 charts & 1 map. [15 refs.]

The writers give a very interesting, if somewhat lengthy, account of all aspects of the malarial problem in Morocco. All types of malaria parasites were found; the mosquitoes responsible are *A. maculipennis* (Meigen 1818), *A. hispaniola* (Theobald 1903), *Pyretophorus myzomyifacies* (Theobald 1907), *A. algeriensis* (Theobald 1903). *A. maculipennis* appears to be by far the most wide-spread species. The geographical distribution of the disease in the Colony is given in full detail.

Blackwater fever appears to be rare—in fact it has been denied that it exists in the country. This, however, is not correct, as at any rate one death occurred, in 1921, in a child of European parentage at the age of 8 from this disease; two cases were reported in 1922.

Prophylaxis follows the usual lines.

The writers find prophylactic quinine of very great utility, particularly if properly taken under supervision.

CLOUARD. **Note au sujet de l'état sanitaire des contingents indigènes du corps d'armée colonial pendant l'année 1922.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1923. Sept.-Oct.-Nov.-Dec. Vol. 23. No. 3. pp. 323–338. With 5 charts.

The writer gives an interesting account of malaria in Madagascar. He is not hopeful concerning anti-larval measures. The main difficulty is undoubtedly the close proximity between paddy land and habitations. He considers that quinine therapy is more likely to give good results if it can be pushed. The main cause of failure

of quinine is that children at the breast cannot be given quinine and they frequently act as a reservoir of parasites, and adults who are not great sufferers from fever are often careless about the taking of the drug regularly.

MACKENZIE (M. D.). **Fighting Malaria. II. In Russia.**—*World's Health*. Paris. 1924. Jan. Vol. 5. No. 1. pp. 12-15. With 3 figs.

The writer gives an interesting popular account of the outbreak of malaria in Russia which followed the revolution and the famine. He says that bringing wood dripping with snow into the house increased the number of mosquitoes there, and suggests that the wet wood acts as an excellent breeding ground for the mosquitoes. This would seem to be doubtful. The main difficulty in dealing with the epidemic was the great lack of quinine.

LEAGUE OF NATIONS. **Monthly Epidemiological Report of the Health Section of the Secretariat.** No. 64. pp. 337-378. With 1 fig. and 13 charts. 1924. Mar. 15. Geneva.

*Malaria in the Ukraine.* 1923.—"Statistics of notification of malaria in the Ukraine, which have just been received, show that during the first ten months of 1923 a total of 446,873 cases were reported. An annual rate of 2,156 per 100,000 population is thus indicated . . . .

"The reported incidence during the period January-October 1923 in the several governments is shown in the accompanying tables and diagram. An extraordinary range in rates of incidence is shown, from 79 per 100,000 in Podolia to 8,059 in Donetz, and it is evident that the highest incidence has occurred in the south-eastern and the lowest in the north-western governments. This fact is significant in view of the great prevalence of the disease in the regions east of the Ukraine."

HURWOOD (Alan S.). **Some Observations on the Use of Oil as a Larvicide.**—*Health*. Melbourne. 1923. Nov. Vol. 1. No. 9. pp. 255-259. With 2 charts.

The writer has done a considerable amount of work on what may be termed the physics of oiling a water as an anti-malaria measure.

"A film exists wherever a layer which has a different composition from the body of the liquid is present at the boundary surface, provided the area and form of this layer are independent of the gravitational forces acting. Wherever the area and the form of the layer depend upon both the surface and gravitational forces, a lens exists."

"From a consideration of the Neumann triangle of forces, a method of specifying the conditions of spreading can be derived. This assumes the surface tension of the under liquid to be pulling in one direction and the surface tension of the upper liquid, together with that of the interface, to be pulling in the other direction. Motion of the edge of the drop takes place in the direction of the greater pull.

"Spreading occurs if the adhesion between the two liquids is greater than the cohesion in the liquid which is in the position for spreading, while spreading does not occur if the cohesion is greater than the adhesion."

A large number of various mixtures of oil were tested in the laboratory.

"Oils investigated—

- |                             |                         |
|-----------------------------|-------------------------|
| (a) Liquid fuel oil, No. 1. | (d) Phinotas oil.       |
| (b) " " " No. 2.            | (e) Sumatra fly oil.    |
| (c) Power kerosene.         | (f) Prince's larvicide. |

"The Phinotas oil and Sumatra fly oil are phenolic tar oil-soap emulsions.

"(a) Phinotas oil contains 0.6 per cent. tar acids.

"(b) Sumatra fly oil contains 6.3 per cent. tar acids.

"Prince's Larvicide is a phenolic tar oil-soap emulsion containing some unemulsified tar oil, and 15 per cent. tar acids."

From the results of experiments on the above it became apparent that the addition of 10 per cent. of heavy oil to kerosene increased its filming percentage and by its heavy nature decreased the volatility of the film.

"The results may be summarized briefly as follows :—

"1. A mixture of 70 parts of kerosene and 30 parts of residual (fuel) oil constitutes the most efficient admixture of these oils for spraying mosquito larvae. Such a mixture is easily worked, and has no clogging effect on the spray. Also it costs less per unit volume than does kerosene, and produces a more durable film than does the latter.

"2. The use of a higher proportion of residual (fuel) oil, up to 50 per cent., is well worth a trial under field conditions. Laboratory experiments indicate that in sheltered localities such an admixture would prove an efficient larvicide.

"3. In the open country, spraying with these oils would have to be carried out at least once a week in quantities of approximately 1 oz. to the square yard. In sheltered pools half this rate of spraying should be sufficient.

"4. Phenolic Tar Oil-Soap emulsions and preparations of the Prince's Larvicide type are very effective in killing mosquito larvae. Containing, however, scheduled poisons, they cannot be used generally, but in restricted areas, no doubt, should prove very efficient.

"5. The addition of a small percentage of vegetable oil to kerosene improves its filming value and also increases the durability of the film. Thus in the spraying of tanks, such admixtures might in the long run prove more economical for use than kerosene.

"It should be noted that these tests were carried out under laboratory and not under field conditions. While to a certain extent these conditions are parallel, there are factors such as wind, rain, and direct sunlight, evidenced in the field and not in the laboratory which have a marked disturbing influence on oil films. These factors have not been considered in the foregoing tests, and practical experience only can show the optimum conditions for oil spraying."

WHITE (R. O.). **Yellow Fever in the Gold Coast: Its Endemic and Epidemic Character.**—*Ann. Trop. Med. & Parasit.* 1923. Oct. 13. Vol. 17. No. 3. pp. 431-437. [5 refs.]

The writer discusses the endemic and epidemic character of yellow fever. He points out that several of the usually accepted theories of the spread of this disease are rather doubtful. The Gold Coast has



been an endemic centre for many years ; on the other hand, it is not infrequent that 5 or even 10 years pass with so small number of cases that it is doubtful how the disease is kept alive. Among a million cases treated in Nigeria in 1920 and '21 there was only one diagnosis of yellow fever.

Europeans get the disease and die from the malady much more rapidly than natives. The idea that Europeans get a mild attack and survive is incorrect, as in recent epidemics 100 per cent. have died. It seems probable that the commerce between the mosquito and the native eradicates the disease not by the process of conferring general immunity but by the death of the virus.

The indigenous native dissociated from the presence of newcomers is incapable of maintaining the virus, but it would appear that the proximity of Europeans and a plentiful supply of *stegomyia* heighten the virulence of the organisms so that outbreaks not infrequently occur. The writer concludes his paper with the following remarks :—

“ It is well known that any break in the chain of essentials which go to produce a yellow fever infection is sufficient to stop, or at least interrupt, the process. The lapse of time which takes place between observed epidemics in West Africa seems to suggest that the chain is delicate in its construction and that the process of building up the virus sufficiently to produce recognisable effects is a long one. Segregation of Europeans—in as far as it obtains in West Africa—appears to have the effect of lengthening the process. It has certainly provided immunity for the segregated, for in no single instance has a case occurred among them. When it is remembered that in segregation areas native servants—often Kroo-boys and natives of the Northern Territories—live in close contact with the European, it would seem that the slightest precautions are sufficient to prevent infection. As Carter suggests in his statement of requirements for the maintenance of a yellow fever infection, the number of mosquitoes may fall short of what is necessary. It probably will be found also, that non-interference with the mosquitoes, overcrowding and lack of light and ventilation are necessary. Routine sanitary work probably interferes from time to time with one or other of these subsidiary requirements, and has the effect of delaying the development of the virus. But sooner or later, it would seem, an area escapes over a period which permits it to become intensely infective, and an outbreak of yellow fever results.

“ The localised character of these outbreaks in a town is due to the well-marked domestic habits of the mosquito concerned. If we look at the spot maps accompanying the Reports of the 1910–11 epidemic, it is easy to see the human agency which carries the disease from one part of a town to another, over distances which leave intermediate areas unattacked.

“ It is, therefore, the infected rather than the infective element which is responsible for the spread of the disease. If we can control the former and keep it from coming into close living contact with the unsegregated European, there is a reasonable prospect of preventing re-occurrences of these outbreaks. Efforts at controlling the other element have hitherto met with very little appreciable success. That temporary success is obtainable has been amply demonstrated during the present epidemic. Towns where the *Stegomyia* index is normally 80 per cent. have, after a week's intensive work, had this figure reduced to below 5 per cent. The means employed, other than fumigation of

the area in which cases occurred, were the usual mosquito brigades under the supervision of European volunteers.

"The effectiveness of this measure, when considered in the light of what has already been said, suggests the advisability of instituting a 'cleaning-up week' at least once a year, in every town where cases of yellow fever have been known to occur within the last twenty years. It should also be a matter of routine that when a case of yellow fever is reported in a Colony, every town with which the infected area is connected by road, rail, or sea, should immediately start energetic anti-stegomyia measures. This will prevent outbreaks elsewhere, for the reason that the number of mosquitoes remaining will not be able to maintain the disease. At any rate, the possibility of a secondary focus being established will be a very remote one. In the intervals between epidemics, Government Medical Officers and other Medical Practitioners should be asked to observe carefully cases of fever which occur in West Africans who are strangers in the place, with a view to early diagnosis, thus ensuring prevention of the development and spread of the disease."

GOUZIEN (P.). **La fièvre récurrente en Afrique Occidentale Française.**—*Bull. Office Internat. d'Hyg. Publique.* 1923. June. Vol. 15. No. 6. pp. 797-806. With 1 map in text.

The writer gives a very interesting account of an outbreak of relapsing fever (mixed with typhus) which occurred in many of the French colonies on the West Coast of Africa, particularly in Senegal, parts of the French Soudan, and French Guinea. He discusses the origin of the infection and is strongly of opinion that it was not due to the return of native troops who were doing service in the near East during the war, but that it originally came via the Soudan from the north.

At the end of May, 1921, the first case was recognised in the Hospital at Bamako. The infection descended the Niger and appeared further down in September. The first wave of the epidemic seemed to be at its height from December 1921 to February 1922. At that date the disease was within 10 miles of the chief town in the Colony of Haute-Volta, and at the end of the year new centres became infected. The number of deaths increased very rapidly and its virulence appeared to increase with its progress. Typhus fever was also present at this time, and the mortality in the people not treated reached 25 to 30 per cent., the total number of deaths being probably as many as 100,000. It is known that in certain villages 27 per cent. of the population disappeared. This following on the epidemic of influenza of 1918 and 1919 was a very severe blow to the Colony.

The writer discusses the various means of combating a disease of this nature. Neosalvarsan could not be supplied in anything like sufficient quantities.

The writer's opinion is that the greatest benefit is likely to arise from the education of the people, exclusion from school of children with lice in their hair and clothing, and general propaganda on these lines.

HEHIR (Patrick). **Typhus Fever in Greek Refugees.**—*Ann. Trop. Med. & Parasit.* 1923. Oct. 13. Vol. 17. No. 3. pp. 347-358. [2 refs.]

The writer gives an account of a severe outbreak of typhus fever which occurred amongst Greek refugees from Asia Minor.

He was serving as the medical administrator to the Red Cross Society in that country and had ample opportunity of studying the disease on the spot.

The article deals with every aspect of the subject, including epidemiology, symptoms, treatment, etiology, pathology and prevention of the disease. The disease was brought from Asia Minor in January of 1923; the city of Athens, Salonica, Patras and Corfu were invaded. The refugees in many cases had nothing but the clothes in which they stood up; obviously, therefore, preventive measures were extremely difficult; the weather was also cold, and there was great overcrowding of the very inadequate shelters that were provided.

As regards preventive measures, the sheet anchor was steam sterilization of the clothing of the individuals, bathing, cutting of hair in all cases of infection and in most of the contacts, the girls' hair being bobbed. Clothes were disinfected in the best apparatus that was available; in some cases Serbian barrel sterilizers, but the writer points out that these are no good in dealing with large numbers, the proper steam sterilizers being then essential. Contacts and people likely to suffer from the disease were given a small bag of NCI powder (naphthalene 96, creosote 2 parts, iodoform 2 parts); these were worn round their necks for a week, after which a fresh one was supplied. As the men were ordered to seek work it was obvious that the segregation of contacts was impossible; everything was done, however, to render their clothing and body free from lice. The writer also points out the importance of the nursing staff wearing a one-piece clothing in order to protect them from louse infestation.

PURDY (J. S.). **The Rat and Flea Problem in the Prevention of Plague.**  
—*Jl. Roy. San. Inst.* 1924. Apr. Vol. 44. No. 11. pp. 438-450.

The writer gives a careful survey of many facts connected with rats and fleas which are well known to the majority of officers in the Tropics. As regards the trapping of rats he gives some rather valuable hints. It is, of course, well known that traps should not be handled by human beings or otherwise the rats become shy of them. He is an advocate of the break-back trap; but points out that any trap that goes off with a bang is fatal to prolonged success. The method recommended is to leave the door of the trap open and allow the rats to feed on the bait without disturbance for a few days until they get accustomed to the trap, then to set the door on the spring mechanism; by this means it is frequently possible to catch a large number of rats at once. He employed many different kinds of baits, such as fish heads, cheese, smoked fish, pine nuts, etc. In a chicken yard small chickens or ducklings are remarkably attractive.

To take away the smell of human beings burning newspaper under the trap is satisfactory.

He does not consider that Rodier's method is practicable, and points out that people object to loosing of the captured males.

On the subject of poisons there is not much new. The use of cultures of microbes has never proved effective in Sydney, and this experience is confirmed in most parts of the tropics.

The writer concludes his paper with the following remarks:—

That after a visit to Batavia in 1920 he was so impressed with the probability of the re-introduction of plague into Australia that he

published the following recommendations to be carried out in the port towns.

"1. That the measures taken to make produce premises rat-proof proved to have been the best insurance we could make against plague.

"2. That the cyaniding of any infected premises was the most effective means of killing both rats and fleas.

"3. That the shutting off of water supplies for rats by the covering of w.c. cisterns was an effective means of clearing premises of rats.

"4. That the only safe method of disposing of garbage in an urban area is by incineration.

"5. That the dividing of the business portion of the City into Blocks and the formation of Block Associations among the business people in each of the 28 blocks, and the combination of representatives into a United Block Association by enlisting the co-operation of the citizens, who worked with the Lord Mayor and the health officials, was a novel and effective organisation which ensured a general clean up campaign and engendered a good co-operative civic spirit.

"6. That public health propaganda by organised Health Weeks, by special exhibits in shop windows, popular lectures, articles in the press, exhortations from the pulpit, special lessons in school, cinema films and posters, all combined to arouse and maintain public interest, and secured the co-operation of the public in encouraging and assisting the work of the central and local health authorities.

"7. That whilst it is impossible to exterminate the rat, it is possible to build him out, and to keep down his numbers by constant trapping and poisoning.

"8. That it is advisable to keep premises, especially public halls, cinemas, theatres, railway and tram carriages, clear of fleas by spraying with a good pulicide such as kerosene emulsion, to which may be added Sassafras, Eucalyptus, Citronella, Aniseed, or other essential oil as a deodorant."

LETHEM (William A.). **The Epidemiology of Bubonic Plague in Great Britain, with Special Reference to its Spread by "*Pulex Irritans*."**—*Jl. State Med.* 1923. Nov. Vol. 31. No. 11. pp. 508-515. [11 refs.]

This is an interesting paper which deals with plague in England and cold countries generally. The writer is firmly convinced, in fact he actually states that it is proved, that *Pulex irritans* is largely responsible for the spread of plague in England, when once a centre of infection has been established by the ordinary rat flea.

"In the ten or twelve recorded outbreaks in Britain in recent years the details are all very similar. The first case is usually connected with a rag store, a grain warehouse, or with docks. The other cases occur in rapid succession in the house in which the first case is nursed. Most, sometimes all, of the members of the household are infected, and then, with dramatic suddenness, the outbreak stops. If there are similar outbreaks in neighbouring houses one can usually trace a definite connection between the two, either by the visits of friends or by the receipt of clothing . . . .

"The common [rat] flea of cold climates is the '*Ceratophylus fasciatus*.' It does not appear to be quite such a successful plague carrier as

'*X. cheopis*,' or such a ready biter of man. It is common in Britain, but the important point is that it does not live for choice on the rat itself, but in the nest, often underground. Thirty or forty may be found in a nest, while the average on the coat of the rat is only one flea to two rats.

"This number is important when the size of an epidemic is considered. During an epidemic, if each patient were infected by a rat flea, one would expect to find at least twice the number of plague rats as of human cases in an infected house. In this country such a number has only once been found.

"The preference of '*C. fasciatus*' for the nest and not for the rat may explain why in this country the first case of an epidemic is so often connected with a rag-store, where nests are often found.

"This flea is known to carry infection for 47 days, considerably longer than '*X. cheopis*,' and like most others can live in suitable surroundings without a feed of blood for at least three months. It would, therefore, appear that man can be infected with plague up to 47 days after the flea has left its host, the rat . . . .

"Man rarely comes in contact with this flea."

The writer considers that *Pulex irritans* has been ruled out as a source of danger on too little evidence. It dies off at temperatures above 85°F. and is uncommon in India. In the outbreaks that have occurred in this country plague infected rats are either found not at all, or they are extremely rare.

"Here are a few examples. In 1914, in a large seaport town, 13 men were working in a factory amongst grain, some of it imported from the East. One man, and one only, fell sick, and was nursed in his overcrowded and flea-infested house in another part of the town. He died of bubonic plague. His wife, seven children, and one of their playmates contracted the disease in a rapid succession. Altogether ten cases occurred, mostly with a high degree of septicaemia. A thorough search was made by a staff of rat catchers at the house, the factory, and at the ships from which the grain had come. Altogether during that year 25,000 rats were caught; 9,000 were bacteriologically examined and none were found to be plague-infected. . . .

"An outbreak in another port town started with a dock labourer, who died. A number of Irish sympathisers attended his wake, and of the 36 persons who subsequently developed the disease, most had been at this function. Now an Irish wake is not the sort of entertainment that a brown rat and its fleas would care to attend, but the '*Pulex irritans*' would, and does, in large numbers. No plague rats were found at the time, though a few were found the following year."

Although the writer adduces a great deal of evidence in favour of his thesis we do not consider that it can be accepted as proved. It is obvious that if by any chance it could be demonstrated that plague in England could be rapidly passed from one human being to another, because of pneumonic infection being common in fatal cases, we have an equally satisfactory explanation of the epidemics that have occurred in this country.

It has been thoroughly established that ordinary bubonic plague is not communicated from man to man under conditions that exist in India, but there is a certain amount of evidence, such as in the Manchurian outbreak, that this does not apply to colder countries. Possibly this factor may be at work in England as well.

REYNAUD (G.). **La peste considérée dans quelques-uns de ses foyers actuels ; sa diffusion et sa prophylaxie.**—*Rev. Prat. Malad. des Pays Chauds*. 1923. October. Year 2. Vol. 3. No. 2. pp. 93-140. [30 refs.]

The writer gives a long and very full account of the subject of plague, its method of spread and prevention. A large number of authorities from all parts of the world are quoted. In a subject such as this there is naturally very little which is new and which we have not already described. Quoting HECKENROTH, he remarks that pneumonic plague is not very infectious in warm countries, but then goes on to distinguish primary and secondary pneumonic plague and qualifies this original statement by the remark that those cases which develop secondary pneumonia are not highly infectious, whilst the primary ones are not only very infectious but prospect of recovery is very small.

WILLIAMS (Louis L.), SULLIVAN (E. C.) & ALLEN (A. F.). **Rodent Infestation and Rat-Proofing Conditions in Massachusetts Seacoast Cities, New York City, and Baltimore.**—*U.S. Public Health Service. Treasury Dept. Public Health Bull. No. 121*. 1922. May. 41 pp. With 1 map. [14 refs.]

The writer discusses rat proofing of harbours and buildings in New York City, Baltimore and other large towns. The following are summaries of the papers, with recommendations, etc.

Massachusetts.—

"Judging from the survey made to date, it would seem that the water fronts of the various Massachusetts ports offer unusually good rat harbourage with abundant food. It is estimated that a good index of the presence or absence of infection among the rodent population could be determined after the examination of about 150,000 rats. Rat surveys carried on as suggested above would yield approximately this number.

"It is recommended that each health department of the various seaports should be advised to carry on in perpetuity a continuous but moderate rat catch. This should yield a catch of about 50,000 rats a year, which would in all probability reveal the presence of infection at an early date after its introduction.

"In addition to a continuous rat catch, each of the seaports should adopt proper ordinances for the fending off of all vessels and the proper placement of rat guards, an ordinance for the proper disposal of garbage, and an ordinance for the ratproofing of new and reconstructed buildings. Model ordinances along these lines are appended. Each town should adopt such ordinances, in toto or in part, in so far as may be necessary to make the total legislation for each port contain at least the minimum requirements of these three ordinances."

New York.—

"1. In the replacement of the older docks rat-proof construction should be considered a factor of great importance. Minor defects, which will tend to neutralize the effect of the major expenditure of money, should be carefully avoided.

"2. Perhaps 15 per cent. of the docks about New York, the majority of which are in the Borough of Manhattan, may be called 'rat proof.'

"3. In view of the ideal conditions about the garbage docks for rodent breeding and harbourage, it is of great importance that the earliest steps in a rodent-eradication or rat-proofing campaign should include measures to improve conditions about these structures.

"4. Unnecessary wood planked areas should be removed. Slightly elevated wood platforms are dangerous from a plague standpoint.

"5. Minor improvements about docks such as repairs to broken double walls and floors, elimination of unnecessary dark spaces beneath and behind small structures on the docks, changes of sheathing so as not to form double walled spaces, removal of rubbish, etc., should be one of the first measures instituted in a rat-combative campaign.

"6. It should be strongly brought to the attention of those concerned with the docks how unsatisfactory it is to install upon docks wooden platforms and similar structures of such design and location that they tend to make ideal breeding places for rodents. Simplicity of design is a factor which tends to make a rat-proof structure."

Baltimore.—

"Baltimore has a numerous rodent population of mixed species, with apparently a predominance of the ground rat along its irregular shore line.

"The economic damage done by these rats, while of unknown extent, is in the total very great.

"There is a potential health danger in the presence of these rats as possible transmitters of bubonic plague, and while this danger is at present unknown, there are means whereby it may be determined and the following recommendations provide these means :—

"1. There should be established in the health department a squad of rat trappers, about eight in number, under a competent, trained foreman, who shall systematically trap given areas of the city, primarily along the water front and dumps. This squad should be considered primarily for the purpose of securing rats for examination for the presence of plague and not for the purpose of eliminating rats from any given building or area.

"2. The efforts of all other agencies concerned with the destruction or collection of rodents should be co-ordinated with this force so that all such rodents may be secured for this examination and so that their source of origin may be known.

"3. A suitably equipped laboratory should be provided in the health department, in charge of a laboratory chief, with a laboratory assistant and a clerk.

"4. Means should be provided in the health department for the transportation to the laboratory of all collected and trapped rodents.

"Such laboratory and trapping forces should be considered a nucleus for further expansion as the need, either economic or health, is shown for them and funds may be available. In the presence of an epidemic of plague a force of some 20 or 30 laboratory workers and from 300 to 400 trappers would probably be required.

"As a means of controlling the propagation of rats and of limiting their depredations, the following recommendations regarding the rat proofing of a community are made :

"5. Strict enforcement of the provisions, as noted in the body of this report, of the present or proposed building codes should be made.

. . . . .

"8. There should be enacted legislation covering the methods and enforcement of rat proofing of such properties as are not now covered by laws, namely :

"(a) Food-handling establishments and stables to be rat proofed by strict compliance with the provisions of the building code, covering : Cement floors, side walls of the building extending into the ground at least 3 feet.

"(b) Small outhouses which may be rat proofed by lifting them off the ground, admitting light under them.

"(c) The elimination in all food-handling establishments and stables of all double walls, ceilings beneath upper-storey floors, and so-called unnecessary spaces ; or if these cannot be eliminated, then the flashing of all angles between floors and walls with metal."

There are also three separate enactments : (1) An ordinance compelling the placing of rat guards ; (2) an ordinance regulating the removal of rubbish and garbage ; (3) an ordinance defining rat proofing of all buildings. These are very useful but are too long to quote *in extenso* here, and those interested in legislation on this point should obtain copies of the Bulletin.

TAYLOR (J.) & CHITRE (G. D.). **Note on an Electrical Rat-Guard for Ships' Hawsers.**—*Indian Jl. Med. Res.* 1923. Oct. Vol. 11. No. 2. pp. 643-652. With 2 figs.

The writers give the results of their experience of rat guards for ships' cables and describe a new device for protecting ports from infected ships' rats which works on an entirely new principle. They point out that the ordinary metal rat guards are not infrequently rendered unsatisfactory by clefts in the metal which act as footholds for the rats ; if the guard does not fit sufficiently tight on to the cable it is useless ; the rivets in the plates act as footholds for the rats, and slacking of cables brings the edge of the guard and the rope together.

Experiments have been carried out with an entirely new guard which makes use of electric current to electrocute the rats as they tread on it.

"A general idea of the guard will be best obtained from the drawing [Fig. 35]. It consists of a triangular box two-and-a-half feet long and of internal dimensions such as will enable it to accommodate and grasp firmly the rope on which it is placed. Two of the sides are rigidly fixed at a permanent angle of 60 degrees. The third side is hinged and the loose edge of this side when the guard is fastened around the rope closes the triangle. A hook at each end is used to fix the guard in position. The angles are filled in by suitably shaped pieces of wood attached to the inside of each end so as to leave no space for the passage of rats. These have been omitted from the drawing for the sake of clearness.

"The guard is 'wired' on all three sides in the pattern shown.

"The 'wiring' is done by means of strips of No. 20 gauge aluminium sheeting. These are  $\frac{1}{4}$ -in. wide and placed at  $\frac{1}{4}$ -in. intervals. The sheeting is a standard article of trade and is inexpensive and is obtainable in the bazaar and in towns such as Bombay. It possesses the advantage of being a good conductor and is not liable to corrosion. The aluminium sheeting is cut into strips on a guillotine such as is used in tin-plate works, as it is difficult to cut absolutely straight strips of



$\frac{1}{4}$ -in. width by means of shears. The strips are arranged in an interdigitating pattern, alternate strips being attached to a transverse strip at one end or other of the guard. The attachment of the strips to the wooden guard and to the transverse strips is done by means of copper tacks. The transverse strips run completely round the guard

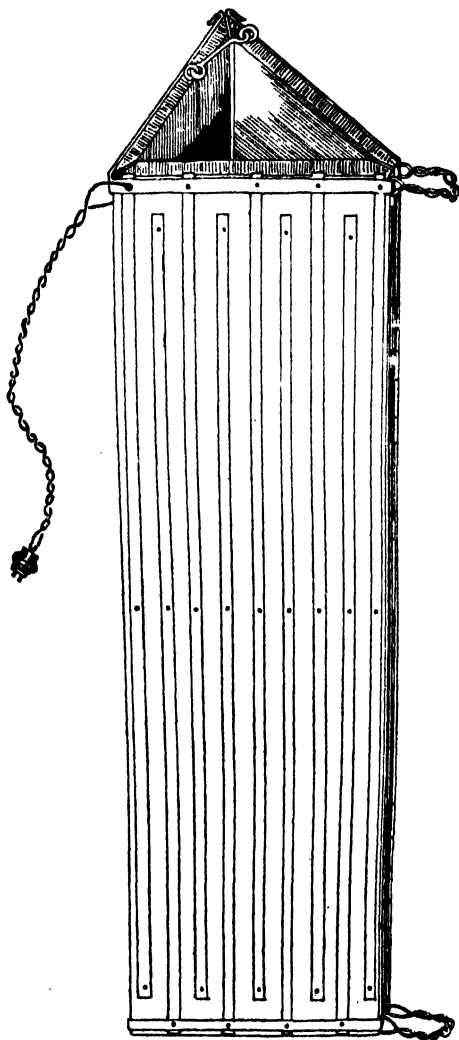


FIG. 35.—Showing details of electrical rat-guard for ships' hawsers.

[Reproduced from the *Indian Journal of Medical Research*.]

except at the hinged angle where continuity is obtained by making a flexible copper wire connection. A wall plug and a suitable length of 'workshop flex,' 'cab-tyre' or other convenient lead completes the apparatus, the two wires of the connection being joined up to the last two aluminium strips."

The current found most satisfactory was 220 volts alternating current. A direct current of 110 volts (the one usually provided on

ships) is not sufficiently strong to stop the rats on all occasions, though under experimental conditions it was found to give a very large degree of protection. Another advantage of this apparatus is that it can be made very strong and is very much more lasting than the ordinary flange guard on cables.

MATHIS (C.). **La lutte contre la peste à Phnom-Penh (Cambodge).**—*Bull. Soc. Path. Exot.* 1923. Nov. 14. Vol. 16. No. 9. pp. 668-674.

The writer gives an interesting account of plague measures at Phnom-Penh, in Cambodia. These do not differ materially from those in other parts of the world.

DORISY (C. E.). **Epidemic of Typhoid Fever and Other Intestinal Diseases in Everett, Wash., July, 1923.**—*Public Health Rep.* 1924. Mar. 28. Vol. 39. No. 13. pp. 605-611.

An epidemic of enteric fever occurred at Everett, Washington, a town of approximately 30,000 inhabitants, obtaining its water supply from the Sultan River, a mountain stream, the water of which flows through a long wooden pipe line.

On July 12th a large number of cases of ordinary diarrhoea were noted in the town. These increased in number till July 20th. The epidemic appeared to be confined to certain parts of the town, but it quickly spread.

Samples of the water taken throughout the area showed very considerable fluctuation in the bacteriological purity at different points. Thus, a sample taken at Pine Street gave coli present in a tenth of a cc., total colony count at 37°C., 8,000, at 20°C. more than 10,000. A sample taken in another part, namely, Maple Street, showed only about one-tenth this number of bacteria. It should be stated that there were two water supplies in the town, a chlorinated supply for drinking purposes and another system of pipes connected with the drinking water main which could be opened and shut in order to improve the pressure and quantity of water available in case of fire. A connection between the treated and untreated water was actually taken into use sometime shortly previous to July (the work being sanctioned in March). Investigation showed that a large quantity of unsterilized water had been allowed to pass into the drinking water supply of the city for a period of 14 days prior to the outbreak. The first case of enteric was reported on July 25th; 77 cases occurred in all. At least 2,000 cases of diarrhoea and dysentery were also reported. Nine deaths were caused from enteric and 2 from dysentery.

Subsequently regulations were made prohibiting the use of cross connexions.

VASQUEZ-COLET (Ana). **The Viability of Intestinal Pathogenic Bacteria in Fruits and Philippine Foods eaten Raw.**—*Philippine Jl. Sci.* 1924. Jan. Vol. 24. No. 1. pp. 35-39. [1 ref.]

The writer investigated the viability of cholera, dysentery and typhoid organisms in certain native articles of food commonly exposed for sale in the market in Manila.

"Experiments with the cholera vibrio show that it survives from four hours to one day, at least, in bagong [which consists of fresh shrimps pickled with salt]; one hour in patis; in vinegar, at the end of one hour no cholera vibrio could be isolated. In native cheese (queso) the cholera vibrio will survive at least two hours. On the cut surface of mangoes, bananas, chicos, and lanzones the cholera vibrio survives at least one day; on the cut surface of guavas it survives at least five hours; on the cut surface of apples it seems to thrive well; at the end of six days the infected apples were still positive for cholera vibrio. On the outside of bananas the vibrio remains viable for at least two days; on the outside of lanzones, one day; and on the outside of apples, four days.

"Similar experiments were performed with *Bacillus typhosus*. From bagong, contaminated with *B. typhosus*, the bacillus could not be isolated at the end of five minutes; in patis, it can survive at least one day; in vinegar, five minutes. In native cheese it is still visible at the end of two days. On the cut surface of mangoes, bananas and guavas it survives at least one day; on that of chicos two days; on the cut surface of lanzones, seven hours; on the cut surface of apples it remains viable for at least three days. On the outside of apples and lanzones, it survives seven hours; on that of bananas six hours."

WINCKEL (Ch. W. F.). **The Framboesia-Problem in the Dutch East Indies.**—*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië*. 1923. Pt. 3. pp. 213-226. With 6 plates. [12 refs.]

The writer gives a valuable account of the anti-framboesia campaign which has recently been carried out in the Dutch East Indies. He describes the disease as a real scourge, tormenting millions of people in Java. It is a disease of the low-lying country, its frequency decreasing as one gets on to the higher plateaus. However, on the Batak plateau in Sumatra (which is more than 3,000 ft. above the sea level) there is a considerable amount of yaws.

"Some physicians in the Dutch East Indies estimate the number of framboesia-patients in their district at 12 per cent. of the population, in other districts the rate is estimated at 90 per cent. An examination of 643 school-children in Acheen showed 348 (55 per cent.) of them to be affected with the disease."

The authorities in Java rapidly came to the conclusion that two things were essential for success, namely, a satisfactory and rapid remedy and a strenuous propaganda amongst the natives.

As regards the former, Ehrlich's salvarsan gave excellent results; neosalvarsan is practically a specific for the disease. As long ago as 1914 extensive use had been made of this drug and the natives were beginning to appreciate its efficacy; the war, however, rendered the purchase of sufficient quantities almost impossible. It was not until 1919 that a beginning of the treatment on systematic lines could be made.

As regards the latter, namely propaganda, the first step was to arrange demonstrations of the efficacy of the drug. A number of patients were treated before an assembly of civil servants, representatives of the natives, native doctors, village chiefs, priests, etc., who were asked to meet again on a certain date, when the treated patients

were inspected by them. The Government doctor then addressed the assembly and emphasized the following four points in his address :—

" 1. Framboesia has grown a true scourge of the population, since so many people are affected who are disfigured, and sometimes cannot walk, cannot work, etc.

" 2. The disease can be healed by applying salvarsan, as may be witnessed by the patients present.

" 3. Therefore the Government intends to bring this medicine within easy reach of the population, provided the population will give its co-operation by paying for this expensive medicine. The poor will be treated free of charge, but on the other hand the well-to-do will have to pay a little more.

" 4. Accordingly those present are invited to commend the treatment solely in the interest of the population, and in their neighbourhood to urge the patients to report themselves for treatment."

A very extensive poster campaign was initiated; some of the pictures are published in the hopes that they may be of use in other parts of the tropics similarly afflicted. (Figs. 36, 37 and 38.)

The campaign became extremely popular, and there is reasonable hope of in time almost entirely eradicating the disease. Some interesting administrative details, however, should not be passed over.

One is that the people of Java now pay for their dose of neosalvarsan, and dating from this the number of applications has gone up steadily and is in some districts nearly 10 times what it was when the distribution was free. The actual expense of the campaign to the Dutch East Indies Government is now trivial. In certain sugar factories and plantations the owners have paid for treatment of their labour. When the treatment became popular it was soon shown that the hospital establishments could not cope with the demand; consequently itinerant medical treatment was given in the villages (Fig. 39). For these dispensaries the following rules were made :—

" 1. Only those are injected who really need a neosalvarsan-treatment.

" 2. The neosalvarsan must be of reliable origin; it has to be of a quality to all appearance above every doubt.

" 3. The dose for a native adult is 0.450 gram at the utmost, corresponding to 0.600 gram for the average European; children get smaller doses according to their age.

" 4. The patients having been injected are not allowed to go home straightway, but should wait at least half an hour.

" 5. For treating eventual collapses, excitantia should be at hand (camphor, digalen, caffein, etc.).

" 6. The injection has to be made *lege artis*. . . .

" The neosalvarsan used by the Dutch Indian Government is supplied at a reasonable price by the "Höchster Farbwerke," according to a special agreement; it is forwarded directly from the factory, in a special packing, and in this way the average cost of a dose of 150 milligram is a little less than 20 cents (freight, packing and duties included). Fifty tubes in an erect position being packed together in one box, one may ascertain at a glance, whether in some tubes the medicine has already assumed the notorious orange-red or brick-red colour. . . .

" By putting a sufficient auxiliary staff at the disposal of the doctors, charged with the injections, and by amply providing them with Record syringes and with reliable needles, the number of injections performed





FIG. 37.—Showing effect of one injection of neosalvarsan on yaws patients.  
[Reproduced from *Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië*. 1923. Part 3.]



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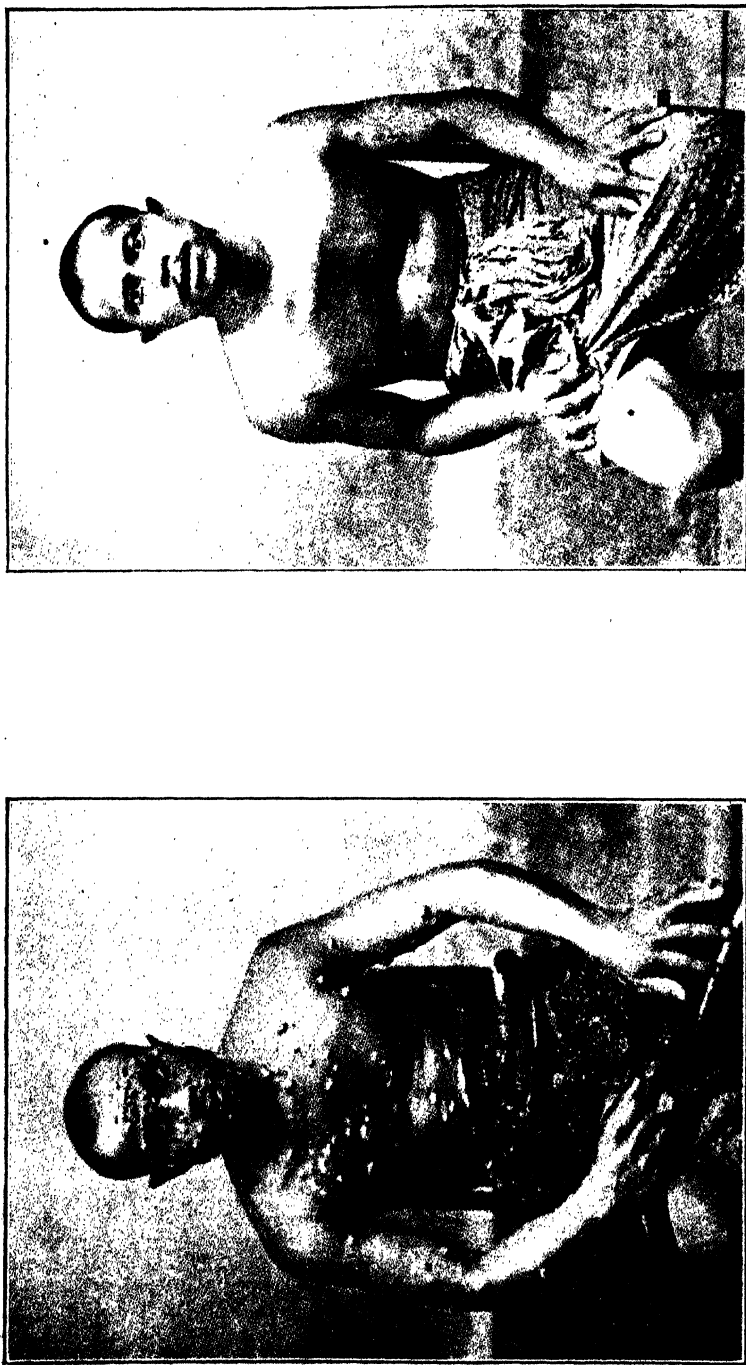


FIG. 38.—Showing effect of one injection of neosalvarsan on a yaws patient.  
[Reproduced from *Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië*. 1923, Part 3.]

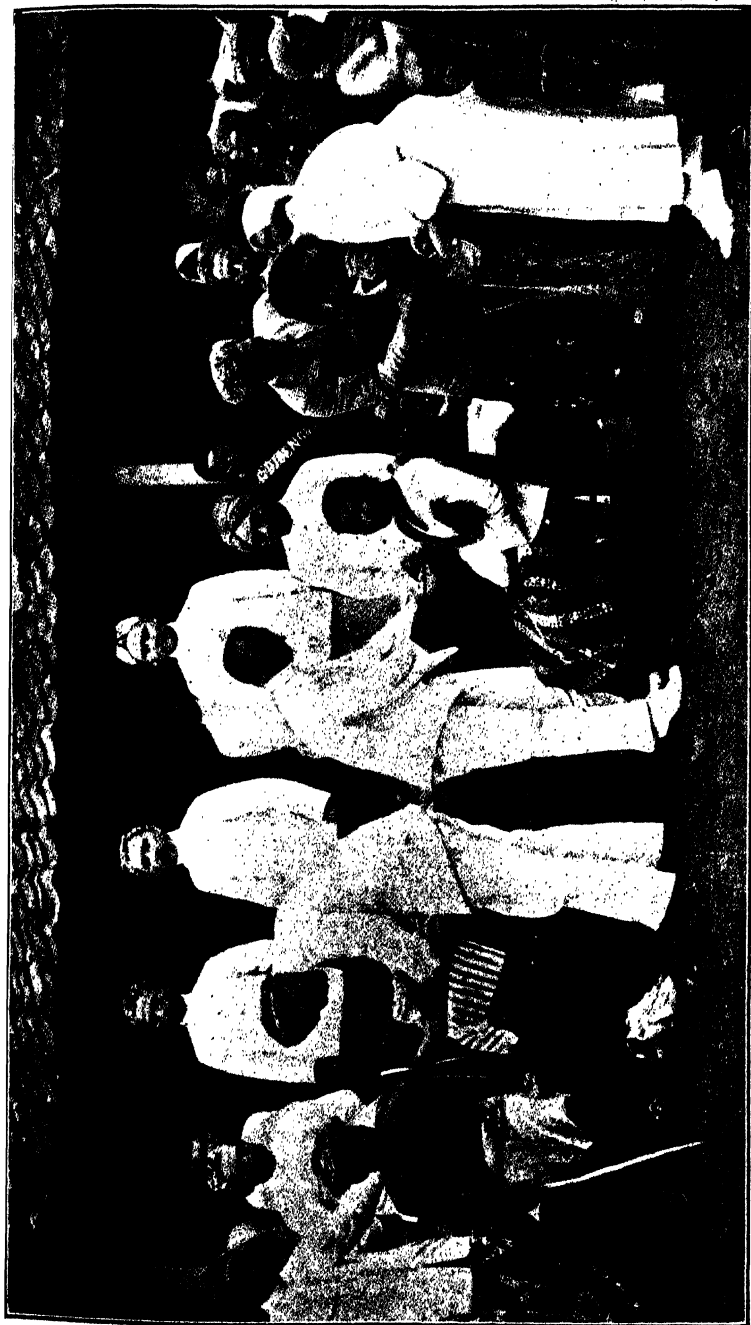


FIG. 39.—Showing medical staff, assisted by the auxiliary staff, treating yaws patients in the Dutch East Indies.  
[Reproduced from *Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië*, 1923, Part 3.]



daily may be enormously increased. In this case the doctor's task is limited to putting the indication, to fixing the dose and to making the injection proper."

As an instance of the appreciation by the people of this campaign the writer gives several native songs which have been written in praise of its authors. Altogether, since the commencement of the campaign up to the end of the first half year of 1923 nearly 1,000,000 people have received the remedy.

**UGANDA PROTECTORATE. Annual Report on Venereal Diseases Measures for the Year ended 31st December, 1922.** [WEBB (W. L.), Ag. Specialist Officer, Venereal Diseases.]—26 pp. With 1 map & 2 charts. 1923. Entebbe: Govt. Printer.

"The population served by Mulago, living in an area whose radius is not more than five or six miles from Mulago, is roughly 100,000. During the time Mulago has been open 6,057 cases of venereal disease have been registered and treated, or 6 per cent. of the population concerned. In the first year 2.6 per cent. of the population were registered. In the second year 3.4 per cent. This includes men and women. The difficulty of inducing women to attend for the treatment of venereal disease is well known and recognised in England. It is more marked here, where the women are relatively to the men less educated and less intelligent than in Europe. Admitting the greater difficulty in dealing with the women, which will be referred to later in this report, let us deal with the men only. The male population may be taken at half the total population, 50,000. 3,775 cases of venereal disease in men have been registered at Mulago since its inception, or 7.5 per cent. of the male population. 1,722, or 3.5 per cent., were registered in 1921, and 2,053, or 4.0 per cent., were registered in 1922. In the Annual Report of 1921, Major Keane expresses the opinion that 10 to 20 per cent. of the population are suffering from acute contagious venereal disease. Taking the average of his estimate, 15 per cent., it is clear that half of the total number infected have been treated since Mulago started, and that over a quarter have registered in 1922. This can only be regarded as a most satisfactory result to be attained in the present early stage of the anti-venereal campaign. I would again emphasize that no conclusions at all are justified from these figures. But the indication is obvious that the anti-venereal campaign is an established factor in the life of the natives who come within its influence, is increasing in popularity and effectiveness and shows every sign of continuing to do so in a greater and greater degree. . . .

"The Policy of Attraction.—From its inception, it has become increasingly evident at Mulago that a venereal campaign amongst the natives of Uganda relying on force for its attendances could not be successfully conducted. The Venereal Rules under the Dangerous Diseases Ordinance, the Township (Venereal) Rules and the Native Law, give us ample powers to examine any suspected person and to treat any infected person. And it was mainly on the powers given under these laws that the original attendances at Mulago were obtained. As the work of the campaign became known amongst the natives and increasingly appreciated by them, so the power of the law became less and less a factor in the campaign, until to-day practically the whole of our attendances are voluntary. . . .

"In place of force, we rely to-day on a general policy of attraction. Sympathetic treatment, efficient treatment, and an understanding of the wants and needs of the native results in greater and more satisfactory attendances than could be obtained through compulsion alone. Good hospital administration, cheerful and pleasant wards, good and varied food well cooked, comfort and cleanliness and a desire on the part of the staff to help, and to alleviate pain or worry, all these attract the native to the hospital, and form an appeal to which he is not failing to respond in a way which he would never do to methods of compulsion."

CARLE. **Quelques considérations sur la prophylaxie anti-vénérienne au Maroc.**—*Maroc-Médical*. 1923. Jan. 15. No. 13. pp. 15-17.

The writer of this letter is a well known authority on social reform and matters concerning the anti-venereal campaign in Lyons who visited Morocco and inspected the work done by the medical authorities in that colony. He points out that the essence of all success in measures of this nature is to give complete control to the medical authorities and take it away from the police.

ALLAIN & AUGAGNEUR. **La lutte antivénérienne à Madagascar pendant l'année 1922.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1923. May-June-July-Aug. Vol. 21 [22 sic]. No. 2. pp. 173-174.

The following figures give some idea as to the amount of work done in combating venereal disease in Madagascar. In 1922 17 new dispensaries were taken into use and more than 30,000 cases were treated, 22,644 tertiary syphilis and 3,281 congenital syphilis. Arsenical injections, 11,476; biniodide injections, 31,854; cyanide of mercury injections, 816.

During 1923 it was proposed to open 21 new dispensaries and the estimated number of doses of novarsenobenzol to be used was 60,000.

CHINA MEDICAL JOURNAL (Supplement). 1924. Jan. Vol. 38. No. 1. 29 pp.—**Report on the Control and Treatment of Venereal Disease in Shanghai.**

The writer gives a long and interesting account of the history of venereal disease control in Shanghai, which dates back as far as 1869. It may, however, be pointed out that the Public Health Department up to 1923 had no power of regulation or control. After a very careful discussion of the whole subject in 1923 certain definite conclusions were arrived at and a summary of the more important of the recommendations is given below.

"1. That in the interest of the Public Health the best public policy in Shanghai is not to foster any official system of supervision of prostitutes.

"2. That prostitution and venereal diseases should be deemed matters of official concern only in the interests of the Public Health, and in the preservation of orderliness and decency.

"3. That the Municipal Council organise a Venereal Diseases Department under the Commissioner of Public Health. . . .

"6. That the Council should organise additional clinics for the treatment of venereal disease among the poor where necessary. . . .

"8. That action against any notorious source of infection should be the concern of the Commissioner of Public Health. . . .

" 15. That the Commissioner of Public Health should investigate and report on the facilities for proper lodging accommodation in Institutes for foreign and native seamen in Shanghai. . . .

" 17. That washerwomen and needlewomen should not be allowed to visit ships unless provided with special permits from the Missions to Seamen or other authorisation.

" 18. That public advertisement of quack cures and remedies should be prohibited, and attempted treatment by unqualified persons should be a punishable offence."

PIERRAT. **La lutte contre la syphilis sur le territoire de Kouang-Tchéou-Wan.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1923. May-June-July-Aug. Vol. 21. [22 sic]. No. 2. pp. 170-172.

The writer gives his experience of the intravenous injections of the arsenical preparation known as 914. They have been very useful amongst the troops and have become extremely popular with the natives in the Province. 146 persons received 542 injections with satisfactory results coupled with treatment by ordinary mercurial preparations.

FEDERATED MALAY STATES. **[Measures for Control of Beriberi.]**-- Extract from letter dated 25 Oct. 1923 [Ref. No. 5 in 119/1923] from the Director of Government Laboratories F.M.S. [STANTON (A. T.)] to the Principal Medical Officer F.M.S. [Received from the Colonial Office Feb. 26, 1924.]

" In the Federated Malay States the following measures have been taken to restrict the use of overmilled rice :—

" *Education and Propaganda*—(a) Pamphlets in English and Chinese and advertisements in Chinese newspapers have been published pointing out the dangers of white (overmilled rice) and the advantages of early hospital treatment for beri-beri; (b) Undermilled rice is being produced in the Government rice mill for use in hospital and public institutions; (c) Government is encouraging the production for local consumption of undermilled rice in small estate mills.

" The fall in the incidence of beri-beri in the Federated Malay States during the past ten years has been so notable that it is thought that simple measures will suffice within a few years to abolish the disease. Even now the recorded incidence of the disease is believed to be in excess of its real incidence. Because of its ill-defined clinical character, 'beri-beri' is a convenient diagnosis for any condition of which weakness of the legs is a feature. Within the past year I have seen cases diagnosed as beri-beri which turned out to be such widely different conditions as 'traumatic myelitis' and 'septicaemic plague.' 'Beri-beri' is also a popular post-mortem diagnosis by Inspectors of Deaths who 'view' bodies before burial."

MARTINEZ BRICEÑO (Rafael). **Lo que ha sido la campaña contra la anemia tropical en Colombia. Datos preliminares.** [Anti-hookworm Campaign in Colombia.]—*Repert. Med. y Cirug.* Bogota. 1923. Oct. Vol. 15. No. 1. (No. 169.) pp. 34-45. With 3 figs.

This hookworm campaign was undertaken under the auspices of the Rockefeller Foundation in co-operation with the local Government, the former providing the personnel. Work was started on June 1st, 1920,

and in the succeeding two and a half years 122,253 persons had been treated, of whom 71,068 are reported as cured, *i.e.*, negative results were obtained on microscopical examination of faeces; many others [the number is not stated] were "practically cured," over 90 per cent. of the worms having been expelled.\*

PHELPS (J. R.). **Eradication of Vermin on Board Ship.**—*U.S. Nav. Med. Bull.* 1924. Feb. Vol. 20. No. 2. pp. 247-268. [3 refs.]

The writer gives an account of the various methods of eradicating vermin on board ship, particularly rats, mice, bed-bugs and cockroaches. As regards rats and mice there does not appear to be anything new.

As regards cockroaches the writer recommends spraying the cracks and corners of the ship with a mixture of cresol and kerosene; this kills the cockroaches very rapidly. Dusting the cracks and inaccessible places with sodium fluoride he finds also very successful. Arsenic mixed with food is not of much use, as the cockroaches soon learn that it is a poison and refuse it.

## WATER.

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1924. Jan. 25. Vol. 65. No. 1671. pp. 65-86. **Municipal Engineering in 1923.**

Water Supply [p. 78].—*A new method of purification.*—"Dr. Gilbert J. Fowler's paper on bio-chemical factors in modern methods of water purification, read before the Mysore Engineers' Association Conference at Bangalore, deals with problems presented by lakes, reservoirs, springs, and wells, and the means by which bacteria can be destroyed. This can be effected in two ways, either by the direct action of anti-septics or by the destruction through oxidation of the food supply of the bacteria, which, in Dr. Fowler's opinion, is the safest method where it is practicable. The purification of river water as generally practised, involves the elimination of suspended matter by plain sedimentation or by sedimentation plus coagulation. Dr. Buswell, of America, has shown that the satisfactory use of a coagulant is a more difficult matter than has sometimes been supposed. Dr. Fowler is in favour of storage in reservoirs in spite of the fact that he has pointed out various possibilities of trouble and difficulties in connection with such treatment. Before constructing storage reservoirs, a careful bio-chemical survey of the river should be made for at least a year, in order to determine the amount of storage to be provided for safety and the best times in which to abstract the river water or to let it pass. What is, however, more important is that Dr. Fowler has shown the possibility of a new method of water purification, which may be much cheaper and much more efficient than any process at present in use. In consequence of experiments made in the Yangtze River, certain facts were established which may have a most important bearing upon work in the future. Great stretches of country through which the Yangtze flows are level

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\* Summarized by Dr. H. Harold Scott.

plains heavily manured with sewage, yet the water of the Yangtze and its tributaries does not show any great sign of pollution, except for the presence of nitrates, which are the products of oxidation of the sewage. Mere aëration, although it is capable of removing many impurities, will not oxidise organic matter, and it is no more possible to purify water containing organic matter by simple aëration than it is to purify sewage by the same method. In the case of sewage it is necessary to provide some material which will form a nidus for the bacteria. In the case of the Yangtze this nidus is provided by a large amount of micaceous silt, which is suspended in the water. Each particle of silt forms a nidus for the purifying bacteria, and thus the water is purified in exactly the same manner as sewage is purified in an activated sludge tank."

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1924. Mar. 21  
Vol. 65. No. 1679. p. 295.—**Water Treatment at Toronto.**

" 'The Chlorination of Water Prior to Filtration' was the title of a paper presented at the American Waterworks Association Convention in 1922 by Mr. Norman J. Howard, bacteriologist in charge, Filtration Laboratories, Toronto. This paper was reviewed in "The Surveyor" at the time. Mr. Howard described the treatment of the Toronto water with chlorine, both before and after filtration. Experiments at that time showed that if the raw water were treated with chlorine before filtration better results were obtained (and a considerable saving of expense was effected) than when it was treated with alum. We then stated that from information given in the paper it was difficult to understand the process fully in all details. This paper has now been further explained and illustrated by an article by Mr. Howard, of which an abstract is given elsewhere. It appears that the water at Toronto is sometimes polluted, but very little suspended matter being present this pollution can be dealt with by chlorination. Formerly the same water was treated with a large dose of alum, followed by filtration. It was found that pre-chlorination with a much reduced quantity of alum gave better results. The cause seems to be fairly evident. There are other times, however, when following storm periods high turbidity occurs. It seemed reasonable to rely upon settlement and coagulation in case of such turbidity, seeing that the problem consisted chiefly in the removal of turbidity and not so much in the removal of bacterial pollution, consequently large doses of alum were used. The discovery has now been made that chlorine treatment not only produces bacterial purification but that it also gives good results for the treatment of turbid water. This has resulted in a great saving of expense, the alum dose being reduced from 2.5 grains of alum to .5 grains. Turbidities up to 100 parts per million were dealt with by 5 grains per gallon of alumina plus .2 to .4 parts per million of chlorine. It is suggested that chlorine may assist clarification when used in conjunction with alum by altering the balance between the electrolytes present.

"Mr. Howard again emphasises the fact that with this change of treatment a larger quantity of water can be passed through the filters, which are of the drifting sand type, and that the filtered water has greater bacterial purity. Careful observation has proved that certain tastes present in the water attributed to the use of chlorine invariably occurred when chlorine was not being applied, and the author therefore holds the opinion that there is no relationship between the taste conditions and chlorine; he, however, considers that the taste is due to the

formation of substitution compounds by the action of chlorine on some prevailing conditions in the raw water. It is rather difficult to appreciate the distinction; a similar problem has been faced successfully in connection with the London water, and it should not produce an insuperable difficulty at Toronto. It is to be noted that the filtered water receives a small application of chlorine before distribution. Further investigation of the value of chlorine for the treatment of water before filtration is certainly desirable, for if, as Mr. Howard suggests, the chlorine produces clarification when used in conjunction with alum the case is certainly established for such pre-treatment."

**FULLER (George W.). Development of Water Purification.**—*Surveyor & Municipal & County Engineer*. 1924. Apr. 4. Vol. 65. No. 1681. pp. 337-338.

"In looking over a copy of the Journal of the American Medical Association reviewing 1922 typhoid fever statistics it is noted that, in 57 principal cities of the United States, with an aggregate population in 1920 of 26,000,000, the typhoid death rate per 100,000 was lowered from 19.2 in 1910 to 3.2 in 1922. There were nearly 3,300 fewer typhoid deaths in 1922 in these cities than in 1910, in spite of an increase in population of approximately 22 per cent. Similar statistics by the Department of Commerce covering the entire registration area show a reduction in the typhoid death-rate from 35.9 in 1900 to 7.5 per 100,000 in 1922."

**SURVEYOR & MUNICIPAL & COUNTY ENGINEER.** 1924. Feb. 22. Vol. 65. No. 1675. p. 207.—**Water Supplies from Polluted Sources.**

"Last autumn there was a serious outbreak of typhoid in Chicago; 198 cases were recorded and there were 16 deaths. The cause of the epidemic is believed to have been pollution of the drinking water with sewage, but the proofs are more inferential than positive. After making very careful investigation, it appeared that the outbreak was not due to milk, oysters, ice-cream, restaurants or swimming-pools. The explosive nature of the epidemic, preceded as it was by an epidemic of intestinal disturbances, is taken as pointing to a typical water-borne mass infection outbreak. The authorities concerned have taken enormous trouble to investigate the whole matter, and they have concluded that the typhoid must have been water carried. It is believed that polluted water, discharged from the Calumet River into Lake Michigan at a point  $3\frac{1}{2}$  miles distant from the water intake, was drawn in. Very strong comments are made in *Engineering News-Record*, and reports are published from the Department of Health, the Bureau of Engineering, the Sanitary District of Chicago, and the State Board of Health. Chlorine is normally applied to this water in small doses, and the opinion is held that if no chlorine had been applied the outbreak would have been of a much more serious nature. The epidemic was comparatively mild in character, one person in 3,000 being attacked. A very small dose of chlorine, however, appears to have been given—namely, .3 parts per million—which we are told was sufficient to kill all but the stronger typhoid bacilli, and that these attacked the least resistant of the water consumers.

"It is important to note that the investigators are of opinion that if more chlorine had been used the epidemic would not have occurred. It does not appear that proper diffusion of the chlorine in the water took place. Colonel A. A. Sprague, Commissioner of Public Works, states that the method of chlorine dosage was wrong; the doses were varied so that the remedy was put into effect after the damage was done, and he is strongly of opinion that the chlorine should be used as a preventive, not as a curative measure, and that the water should be dosed at all times, so that there should be a fixed amount of residual chlorine. It does not appear, however, that such serious pollution of the water as led to the epidemic is constant. The typhoid epidemic appears to have been due to the fact that a very heavy rainfall caused an excessive flow of polluted water from the Calumet River to flow into Lake Michigan, this river being badly polluted by the towns above, and that heavy winds blew at the same time directly towards the water intake. Dr. Bundesen, of the Department of Health, states that it is impracticable to control the chance of pollution of the lake water, and that similar epidemics are likely to be experienced at Chicago unless the water is filtered. It is probable, although it is not so stated, that the very small dose of chlorine given was due to the fact that tastes and odours resulted from a heavier dose. Mr. H. F. Ferguson, chief engineer of the State Board of Health, and Dr. Isaac D. Rawlings, director, advise that studies of the organic content of the lake water should be made in order to counteract tastes and odours resulting from treatment. It is also recommended that consideration should be given to the installation of filters to clarify and purify the water before chlorination."

VAN BREEMEN (M. L.) & MOM (C. P.). **De sterilisatie van drinkwater door chloor.** [Sterilization of Drinking Water by means of Chlorine.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1923. Vol. 63. No. 6. pp. 951-969.

Chlorination is generally recognised as an efficient method of sterilizing drinking water. The authors recommend the use of *Caporit* (Bayer), a preparation of great stability, containing over 50 per cent. active chlorine, on which, according to the authors' experiments, its action depends. It dissolves readily and makes the complicated apparatus used for adding chlorine gas to water superfluous. Besides that, it is cheaper than chlorine.\*

TOMB (J. W.). **A Practical Method of Preserving Chloride of Lime in India.**—*Indian Med. Gaz.* 1924. Feb. Vol. 59. No. 2. pp. 84-85. With 1 fig.

The writer gives a description of a particular jar which he uses for storing chlorinated lime in the tropics. It can be obtained from Messrs. Burn & Co., Raniganj. It is obviously adequate, but we should like to point out that if users of chlorinated lime would specify that it be mixed with 10 per cent. quick lime in the works it is very doubtful whether air-tight jars are necessary at all.

\* Summarized by Dr. W. J. BAIS.

## FOOD.

HALE (Harrison) & BLEECKER (William L.). **Active Chlorin as a Germicide for Milk and Milk Products.**—*Jl. Agric. Res.* Washington. 1923. Nov. 24. Vol. 26. No. 8. pp. 375–382. With 1 chart & 3 plates. [3 refs.]

The writer describes experiments that were made in the use of chlorine in the sterilization of milk. We do not give the details because we are extremely doubtful whether its use is likely to become general. The conclusions reached are given below. It may also be noted that the ortho-tolidin test for chlorine, which claims to operate in 200,000,000 parts of water is useless in milk. Starch iodide one part in 160,000 works satisfactorily.

"1. Active chlorin does act as a germicide in milk and in ice cream with a reduction in the number of bacteria in general proportional to the amount of active chlorin present.

"2. Chlorin water gives as satisfactory results in 45 minutes as sodium hypochlorite does in 90 minutes, or calcium hypochlorite does in 19 hours. The chlorin water could be used in higher concentrations than the other two without an effect upon the flavor.

"It is not the wish of the authors that this paper be considered in any way as a recommendation of chlorin for treating market milk. Much more work must be done before any final decision can be reached. We hope our results may stimulate further research."

WEBER (F.). **Essai de réhabilitation du lait Marocain. Son hyperacidité naturelle n'est-elle pas un mythe ?**—*Maroc-Medical.* 1923. Jan. 15. No. 13. pp. 13–15.

The writer discusses the chemical composition of cow's milk in Morocco and compares it with that of cattle in France.

## CONSERVANCY.

TEMPLE (Frederick Charles). **Drainage of Country Towns in the Plains of India.**—*Surveyor & Municipal & County Engineer.* 1924. Feb. 29. Vol. 65. No. 1676. p. 242.

"For final disposal, pumping systems have more choice of site than gravity systems. In the past the absence of attempts at sullage disposal and the assumption that the outfall necessarily would be a source of nuisance have adversely affected the design of whole schemes. Town planners and welfare workers are now dissatisfied with the economic loss of the manurial value of waste liquids. India is particularly well adapted to disposal on land. Some caste difficulties have to be overcome, but the possible return can be worth while. Sullage is already taken for intensive garden cultivation; the methods are primitive and incomplete, giving rise to nuisance, but they are capable of improvement.



"The area of land required is 1 acre for every 5,000 to 10,000 gallons. Compared with average English figures this is low. Possibly it is due to the high absorbent power of the land and the low humidity robbing the already highly-concentrated sullage of the water necessary for purification. The average quantity of water used is 3 to 5 gallons per head from wells and 10 to 20 gallons where there is piped supply. The quantity of sullage for disposal from a well supply is 1 to  $2\frac{1}{2}$  gallons per head. Sullage disposal may occasionally bring in a small revenue, if worked by garden cultivators; usually, however, it will be worked at a slight loss.

"For ease of sullage disposal numerous outfalls generally are to be preferred. Natural drainage lines should be followed wherever possible, except that sullage outfalls should be kept as high as possible to make irrigation over land practicable. Special difficulties are met with in riverside towns. Most of the town slopes away from the river, and the problem of sullage disposal on the part sloping to the river has not yet been solved.

"Some outfalls are so bad that no satisfactory scheme is possible without pumping. The limiting gradient is 1 in 500; flatter slopes than this are too difficult to clean. Subject to this gradient, outfalls should be kept as high as possible. Extreme care is necessary to use all available fall to the best advantage. It is occasionally desirable to cut through a natural watershed. Local hollows must be protected by catch-water drains. A very small drain is the best size for sullage, while for monsoon flow a very large area is required. A compromise is struck by allowing for a  $\frac{1}{4}$ -in. discharge of rainfall per hour. Occasionally outfalls may be designed for  $\frac{1}{2}$  in. per hour. A V-shaped cross section is recommended . . .

"A satisfactory capacity for disposal works, calculated per head of population served, is 2 cubic ft. per user for the septic tank and 3 cubic ft. per user for the filtering medium, for a rate of 5-40 gallons per head dilution, provided the sewage is fresh. Brick ballast only is available as a filtering material in many places."

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1923. Oct. 19.  
Vol. 64. No. 1657. p. 285.—**Sewage Treatment: Need for State Research Work.**

"This country 'cannot afford to go on spending £7,000,000 per annum on works of sewerage and sewage disposal without the fullest guidance science can give.' We most heartily support this opinion expressed by Mr. A. J. Martin in his paper to the Institution of Civil Engineers on the bio-aëration of sewage, of which an abstract is given elsewhere in these pages. Mr. Martin has dealt with his subject wisely and impartially. He reviews the different methods, and concludes his paper and argument by showing the need for following up the valuable investigations already made, by carrying out researches on a scale worthy of the subject. He shows that in no department of applied science is the need for research work more pressing than in that of sewage treatment. The Royal Commission on Sewage Disposal urged the creation of a central authority competent to undertake this work, but since the final report was published the whole subject has been revolutionized by Dr. Fowler's discovery of activated sludge treatment, or the bio-aëration process. Other workers, like Mr. Haworth, of Sheffield, and Mr. Bolton have shown the practicable possibility of treating

sewage by methods which differ from those adopted by Dr. Fowler, working apparently on the same theory. If the need for research work was recognised at a time when the design of sewage disposal works was more or less standardized, much greater is the need for it under present conditions."

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1924. Jan. 25. Vol. 65. No. 1671. pp. 65-86.—**Municipal Engineering in 1923.**

*Activated Sludge* [p. 72] :—" It may be said that while there are great differences of opinion among chemists as to the action which takes place in the activated sludge process, these differences are largely due to the different conditions under which the various workers have carried out their experiments. On the whole, it seems that the quantity of oxygen required for the process is less than the chemists at one time believed it to be. It is possible, however, that chemists, who are not engineers, may have been under the impression that the chief reason why air was blown into the sewage was in order that aëration might take place. They were probably unaware that the air bubbles were blown into the sewage because this was believed to be the most efficient method of agitating the sewage and inducing a flow. The chemist appears to be under the impression that if he can prove that the quantity of oxygen required may be reduced, a corresponding saving in power may be effected. But is this so? Could Mr. Haworth reduce the size of his tanks at Sheffield, or do away with any of the agitating appliances, if the fact were proved? Or would a smaller quantity of air per gallon suffice in that case for the diffuser system? Obviously not. Whatever may be the requirements for oxygen absorption, no one has yet suggested that agitation can be diminished.

" As was shown last year by Mr. Garner, it is possible to treat sewage in such a manner that by the addition of chemicals, changes are brought about which make it possible to purify sewage containing trade wastes with less aëration than would otherwise be required, and the Huddersfield experiments showed distinctly that, in the case of activated sludge treatment, it is sometimes possible to effect great economy by combining the chemical and activated sludge processes. Another fact which is of great importance, and which is deserving of further investigation, is that which was reported by Mr. Garfield, who found that it was possible to replace chemical precipitation and grease extraction in the case of the sewage of Bradford by aëration which induced bacterial action. In short, we see here the possibility of the precipitation of sludge by means of aëration, instead of by means of chemicals."

BARRETO (João de BARROS). **Typos de latrinas ruraes.** (These XV do 1º Congresso Brasileiro de Hygiene).—18 pp. With 13 figs. Curityba : Placido e Silva & Comp. Ltda.

In this paper is discussed the subject of disposal of faeces in rural districts. The various types of latrines which have been installed from time to time as applicable to isolated dwellings or for small communities, and for temporary or permanent use, are mentioned.

Such questions as the nature of the soil, the means for removal and dealing with the excreta are also briefly referred to. The publication is in the main a summary of papers previously issued on the subject.\*

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\* Summarized by Dr. H. Harold Scott.

FRUMAU (F. C.). **De Septic tanks van Soerabaja.**—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1923. Vol. 63. No. 6. pp. 931-944. With 2 plans.

Frumau defends the septic tank system used at Sourabaya against the remarks made by WILLE (see Sanitation Supplement No. 1, 1924, p. 32). The separation screen near the inlet causes a proper washing out of the upper layers in front of this screen by the affluent, promoting the decay of this matter. In the second part of the tank the most important decomposition takes place. After deducting the height of the floating parts of the contents of the tank there remains no important difference between the depth Dr. WILLE requires (125-200 cm.) and that allowed at Sourabaya (80 cm.).

No town draining being possible at Sourabaya, all the liquid refuse has to flow off into the soil. The effluent of septic tanks generally flows over into a sewer pit, which should not however receive any rain or household waste water. For a more even spreading of the liquids in the soil these pits should be comparatively small, and in blocks of houses there should not be several tanks connected with one pit.

The difficulties which the described state of affairs gives rise to are discussed in detail, but where trouble occurred such could never be ascribed to the septic tanks if properly constructed.\*

- i. GRIJNS (G.). **De constructie van Septic Tanks voor de Tropen.**—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1924. Vol. 64. No. 1. pp. 183-185.
- ii. VAN SANTWIJK (J. A.). **De Septic Tanks van Soerabaja en Semarang.**—*Ibid.* pp. 186-190. With 1 fig.

i. Grijns defends CLEMESHA's type of septic tank against the remarks made by WILLE, using practically the same argument as FRUMAU (see above). He admits that the distance from the bottom to the level of the contents should be at least 1.20 Meter. It is essential that a sufficient quantity of water enter the tank (25 L. per user).

ii. Van Santwijk also reports favourably on this type of septic tank, but supports WILLE's contention that the depth should be more than 0.72-0.88 M. Possible reasons of bad action of a tank are: (1) faulty dimensions or wrong dilution of the contents, (2) not filling the tank with water before taking it into use; (3) overloading the tank, especially to begin with, before it has ripened; (4) the use of disinfectants.\*

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1924. Feb. 29. Vol. 65. No. 1676. p. 238. With 2 figs.—**Public Service Motor Vehicles. Two-wheel Trailer for Refuse Collection.**

"The accompanying photographic views (Figs. 40 and 41) show the 'Eagle' patent two-wheel trailer as applied for house refuse collection by the Dublin Corporation. By this system horses are used for drawing the trailers for loading operations and when full the vehicles are taken to the destructor or dump by the tractor. One tractor to three trailers is usually used. It will readily be seen that the men

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\* Summarized by Dr. W. J. BAIS.

collecting and loading are continuously employed, while the tractor and driver are likewise engaged the whole of the time on transport.

"For houses refuse collection these trailers—which are made by the Eagle Engineering Company, Ltd., Warwick—are usually fitted with roller bearings to lighten the draught for the horses. The illustration shows  $3\frac{1}{2}$  tons capacity outfits.

"The firm's patent two-wheel trailer has a number of advantages. It can be backed with remarkable ease. Secondly, the loading height is considerably reduced thus causing a large saving in filling, and with a castor wheel the trailer can be drawn by horses. The coupling, which is of a ball type, is exceedingly easy to connect up to the tractor, and the operation of changing over from horse to tractor is only a matter of half a minute or so."

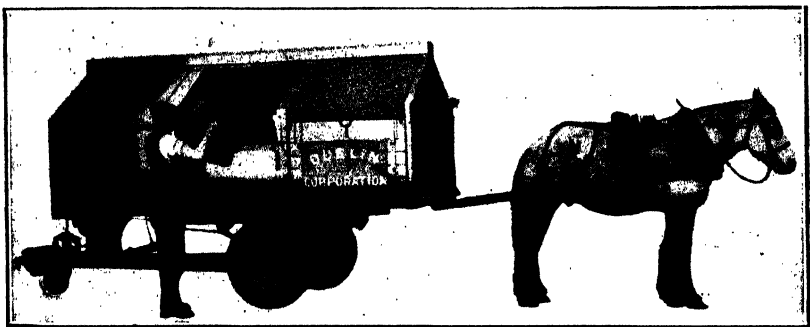


FIG. 40.—The "Eagle" Patent Two-Wheel Trailer in use for house refuse collection; showing the  $3\frac{1}{2}$  ton size fitted with horse shafts and a castor wheel at the drawbar end.

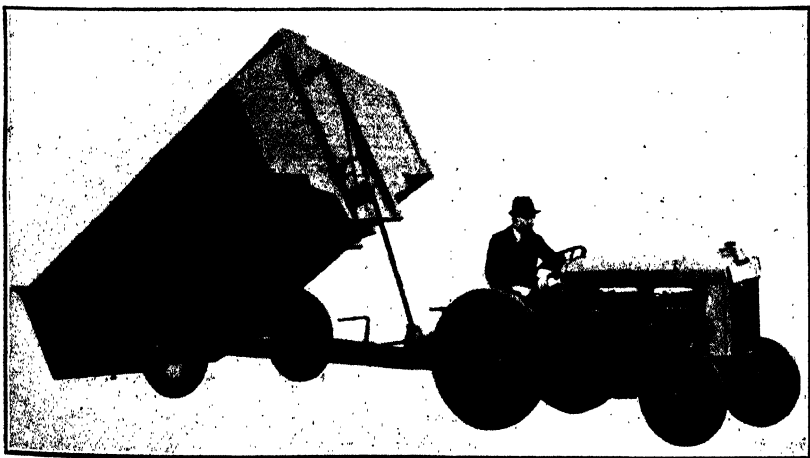


FIG. 41.—The "Eagle" Patent Two-Wheel Trailer connected up with a Fordson or similar type of tractor for drawing load to the destructor or dump.

[Reproduced from photographs supplied by the Eagle Engineering Co., Ltd., Eagle Works, Warwick, England.]

## SMALLPOX VACCINATION.

PUNJAB. **Report on Vaccination in the Punjab for the Year 1922-23.**

[FORSTER (W. H. C.), Director of Public Health.]—pp. 2+6+xiv.  
With 1 folding chart. 1923. Lahore : Supt. Govt. Printing.  
[Price : Rs.1-4-0 or 1s. 8d.]

"The Java modification of my original system of lymph cultivation having been favourably reported on by the Director, Central Research Institute, after a visit to the far east, it was taken up experimentally towards the close of 1921-22. The experimental results being uniformly satisfactory the modification was adopted as standard during 1922-23. The modification consists in the introduction of the rabbit in my cow calf-buffalo calf cycle and so far has doubled the yield of a buffalo calf. Maximum potency on the cycle of alternation has not yet been attained, the indications being that the end point will be reached with a yield slightly under thrice that of the original cycle."

## DISINFECTION.

STOCK (P. G.) & MONIER-WILLIAMS (G. W.). **Preliminary Report on the Use of Hydrogen Cyanide for Fumigation Purposes.**—*Ministry of Health. Reports on Public Health and Medical Subjects.* No. 19. pp. viii+84. With 17 photographs & 8 figs. 1923. London : H.M. Stationery Office. [Price 2s. 6d. net.]

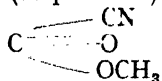
— **Some Consideration on the Use of Hydrogen Cyanide and Allied Substances, with Special Reference to International Preventive Medicine.**—*Proc. Roy. Soc. Med.* (Sect. Epidem. & State Med.). 1924. Feb. Vol. 17. No. 4. pp. 9-27. With 17 figs.

The writers give an exhaustive report of the use of HCN. in the fumigation of ships; they have personal experience of the methods employed, as they have visited various Ports in other countries.

The report is well illustrated. The illustrations reproduced (Figs 42-48) show the various methods of using the preparations described.

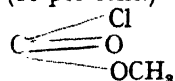
Two methods of using HCN derivatives have not received much attention in other numbers. One of these derivatives, cyklon, possesses the following formula :—

Methyl Cyano-Formate  
(90 per cent.)



+

Methyl Chloro-Formate  
(10 per cent.)



It is an easily volatile material, something like petrol in appearance, with a strong lachrymatory power; hence its superiority over ordinary HCN, because even in non-poisonous quantities it is capable of causing lachrymation.

The material is poured in a fine spray out of a specially designed watering can, a picture of which is given (Fig. 49), 4 litres is required for 100 cubic metres of air space; a long contact is necessary, namely,

about four hours, and it is not very easily removed by ventilation ; 12 to 24 hours appear to be necessary. Cyklon costs 7s. 6d. per litre, so that it is rather expensive.

Cyanogen chloride has the same good points as cyklon ; it also causes lachrymation. This is manufactured by adding a mixture of sodium cyanide and sodium chlorate and hydrochloride acid in the following proportions.

Sodium cyanide	4 oz.
Sodium chlorate	3 oz.
Talc	2 oz.
Hydrochloric acid	17 fluid oz.
Water	17 fluid oz.
Per thousand cubic feet.	

It has been used considerably by the United States Quarantine Service.

The writers end their very able report with the following brief conclusions.

" In their preliminary report the Board appointed by the Surgeon General of the United States Public Health Service to investigate the subject of fumigation of ships, have laid down certain requirements which the ideal fumigant should meet.



FIG. 42.—The " Dumping " Method.

Deck of vessel prior to fumigation. Fumigator ready to lower into a barrel in the hold a charge of solid cyanide contained in a bag. This " dumping " method is largely used in the United States for the fumigation of holds of vessels, but is not advocated unless carried out in spaces with immediate access to the open air, and by trained operators.

[Reproduced from *Reports on Public Health and Medical Subjects*, No. 19, by permission of the Controller of H.M. Stationery Office.]

" Briefly, these requirements are as follows.

" High toxicity; easy detection, by the senses, in sublethal concentrations; harmless to goods; efficient penetrative qualities; non-persistence; reasonably low cost; furnishes no fire or explosive hazard; ease of manipulation. It should also be non-corrosive to metals and harmless to fabrics.

" With these requirements we agree, but we have not yet sufficient experience to say whether under the conditions of practical fumigation cyanogen chloride gas mixture meets them or not.

" We trust, however, that we shall soon have an opportunity of investigating the practical use of this gas. For the present we defer other expressions of opinion to a further report.

" Cyklon appears to meet many of the requirements, but unless time is no object, takes too long to clear. Whether it could ever be used on a large scale would also depend on its relative cost and availability of supplies. We understand that up to July, 1922, some 14 vessels as well as a number of buildings had been treated with cyklon at Rotterdam and we think that its further use should be closely followed.

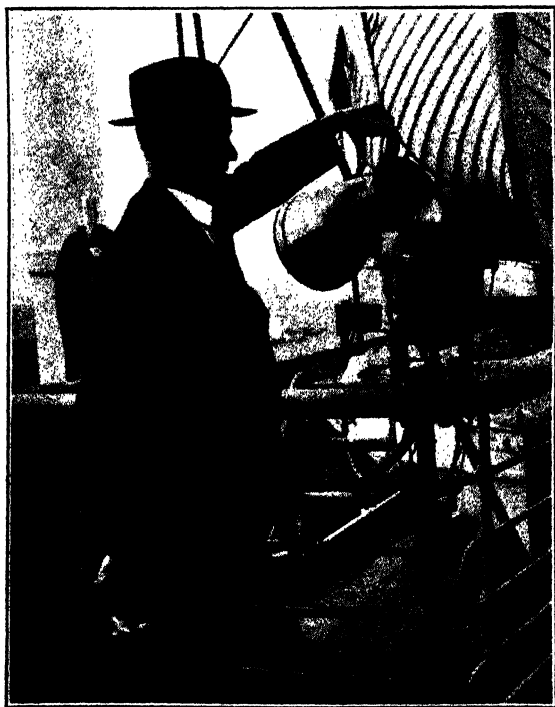


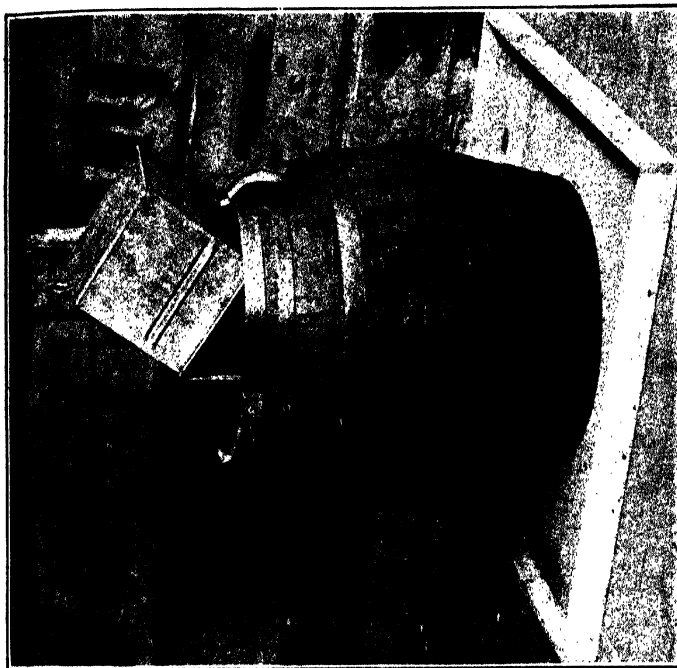
FIG. 43.—The Solution Method.

Operator pouring solution of cyanide into a single funnel rigged on the boat deck. Note the rubber pipe from the bottom of the funnel passing outside and down over the side of the ship to the barrel in the hold, which contains the acid solution.

[Reproduced from *Reports on Public Health and Medical Subjects*, No. 19, by permission of the Controller of H.M. Stationery Office.]



FIG. 44.—Type of barrel used in Great Britain with "tipper" attached in which charge of solid cyanide is placed. The tipping is performed from a distance by means of ropes or wires attached to the containers, the operator standing in the open air.



The "Tipping" Method.

FIG. 45.—A barrel showing position of container after tipping. Note.—The hinge cover has swung open, allowing the cyanide to fall into the barrel.

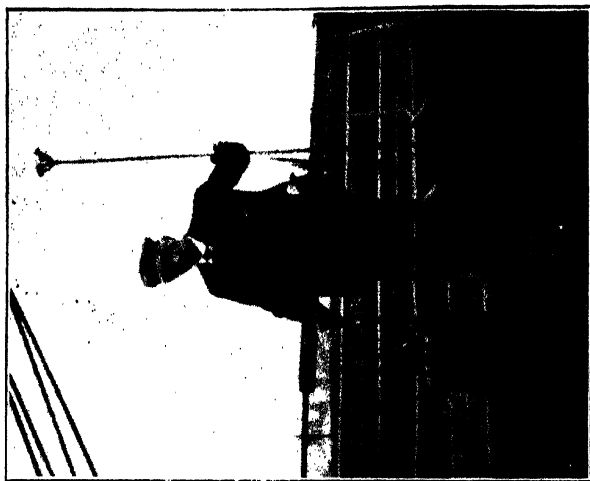
[Reproduced from *Reports on Public Health and Medical Subjects*, No. 19, by permission of the Controller, H.M. Stationery Office.]  
(Photographs kindly supplied by Messrs. Siebe Gorman & Co.)





FIG. 46.—The liquid hydrogen cyanide is here stored in steel cylinders weighing, when full, about 200 lb. and containing 70 lb. of the liquid. In the photograph two such cylinders are "lashed" to the rail. Note the flexible pipe connecting the outlet valve of one cylinder to a portable container of a capacity of 25 lb. The operator protected by mask is about to start pumping air into the cylinder and so fill the container.

[Reproduced from *Reports on Public Health and Medical Subjects*, No. 19, by permission of the Controller of H.M. Stationery Office.]



Liquid Hydrogen Cyanide Method.

FIG. 47.—Portable container ready for use. Note the distributing spray in left hand of operator. This spray, consisting of a metal pipe fitted with four spray nozzles, is connected to the outlet flexible pipe and the "tyre" pump for emptying the container is connected to the inlet valve.

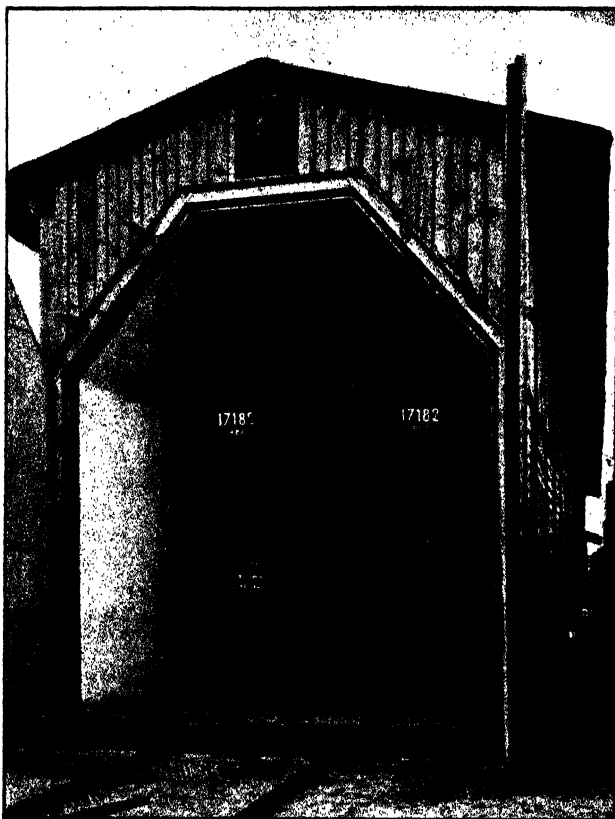


FIG. 48.—Chamber or tunnel constructed by the local authorities in Warsaw in 1920 for hydrogen cyanide fumigation of railway carriages. The chamber is large enough to contain several railroad cars and can be hermetically closed. After fumigation the gas is withdrawn from the chamber by means of fans and passed through a stove where it is burnt.

[Reproduced by permission from the *Proceedings of the Royal Society of Medicine* (Section of Epidemiology and State Medicine).]

#### *Summary and Recommendations.*

"In this report we have referred only to the more important considerations in regard to the practical use of hydrogen cyanide for fumigation purposes. We have no doubts as to the efficacy of the process, if properly carried out, or as to the danger unless every precaution is taken. For the present we consider that the application of the process must be classed with other hazardous occupations. The lines on which safety rules may be laid down have already been indicated, and the advantages of a system of licensing firms operating the process have been insisted on. Investigations are necessary particularly in regard to the diffusion of the gas and means of artificial ventilation.

"Without further experience we do not feel justified in expressing definite opinions either in regard to the Glen Liston apparatus, or the use of cyanogen chloride. If the hopes entertained for the cyanogen

chloride mixture are fulfilled, it is probable that it will replace hydrogen cyanide as a fumigant. We trust that we shall have opportunities for further investigation.

► "There remain two other points to which reference must be made. The first is a suggestion put forward by Engineer de Bruyne, of Rotter-

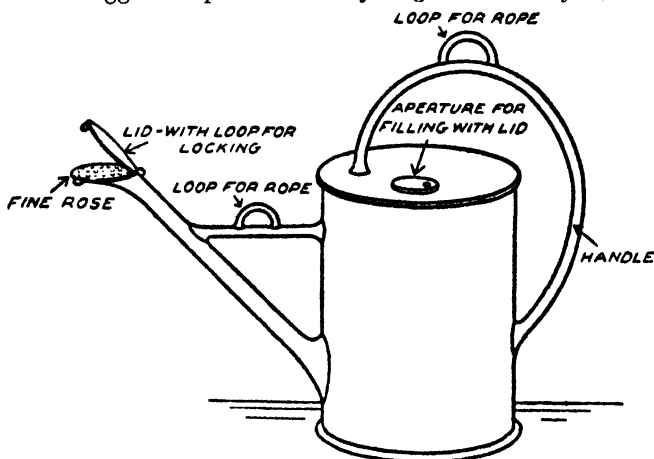


FIG. 49.—Specially constructed copper "watering" can or sprinkler for use in distribution of cyklon. Each can is fitted with a fine "rose" and is so constructed that it can be easily emptied. The "rose" is covered with a closely fitting hinged lip which is open only when the can is in use. Metal loops are also provided to which ropes can be attached when the can has to be lowered.

[Reproduced from *Reports on Public Health and Medical Subjects*, No. 19, by permission of the Controller of H.M. Stationery Office.]

dam, that when new ships are designed, the question of the future fumigation should be borne in mind. The second is a tendency evinced by American authorities to relax their requirements as to periodic fumigation in the case of vessels which are constructed with a view to rendering them free from rat harbourage. We have had no opportunity of considering these suggestions. On certain vessels there are arrangements for fumigating the holds with sulphur, but this is perhaps not quite the same thing. We are a little doubtful whether, in the absence of definite data, it would be possible to interest naval architects in the matter, but it is worth while to pursue the question further."

## INFANT WELFARE.

FABELLA (José). **La situation de l'enfance aux colonies. La protection de l'enfance dans les îles Philippines.**—*Bull. Internat. de la Protection de l'Enfance*. 1924. Apr. 30. No. 25. pp. 350-359.

The writer describes the arrangements made for Infant Welfare work in the Philippines. In 1921 there were 80 Welfare centres, in December 1922 there were 183, and 146,752 mothers and infants profited by the work, and now the number of centres is nearly 250 and half a million persons benefit. There are three different categories of centres—(1) those worked directly by the "Commissaire de l'Assistance

Publique," (2) those directed by provincial councils ; (3) those maintained by private organizations with help from government. The dépôts are classified also according to their functions and to the activities which they undertake. Thus class

(a) Employ doctors who give consultations two days a week and a nurse who is whole time in the Institution and who makes domiciliary visits.

(b) Centres that have a whole time nurse and a doctor whose services are not regular but are available occasionally.

(c) Centres where the nurse gives part-time work and spends the remainder in visiting patients in their homes.

(d) Centres similar to the above but where the services of qualified persons cannot be guaranteed because of lack of funds.

	1918.	1919.	1920.	1921.	1922.
Population ...	9,943,418	10,101,371	10,259,325	10,465,822	10,547,349
Infant mortality per 1,000 children born ...	262	235	160	168	154

Under the same branch of the service are large orphanages, and much propaganda work has been started, such as " cleanliness weeks," etc.

**RADEMAKER.** *Etat de l'enfance aux colonies. Rapport sur la Guyane hollandaise (le Surinam).*—*Bull. Internat. de la Protection de l'Enfance.* 1924. Apr. 30. No. 25. pp. 360-367.

The author gives an account of the mortality rates in Dutch Guiana. His conclusions are that the maternal mortality is not great, but that help and assistance for women about to become mothers is not available ; that government will always provide suitable staff and assistance if the people will make use of it ; that the only way to increase the benefits to mothers and infants is to combat venereal disease and to combat tropical diseases and the superstitions and prejudices of the people.

It is also desirable to punish all midwives acting without qualifications.

Special government measures are (1) the foundation of a school for trained midwives ; (2) free treatment by midwives, pre-natal, at birth, and for nine days after ; free consultation at state hospitals before and at birth, if desired ; treatment of the infants at the polyclinics in the towns and plantations.

**WISHART (W. de W.).** *Infant Welfare Work in Georgetown, Past, Present and Future.*—*British Guiana Med. Annual for 1923.* pp. 35-42. With 1 chart.

This article is largely historical. Last year a crèche was established by the Baby Saving League. The health visitors consider that during the past five or six years the standard of motherhood has been steadily improving, breast feeding being now the rule, not the exception, cleanliness of the home is considerably improved, and whereas formerly they were looked upon with suspicion, they are beginning to be wel-

comed as friends. The following table shows that the mortality figures amongst those visited by the health visitors are very much lower than amongst the less fortunate population :—

Year.	General infant mortality rate.	Mortality rate for infants visited.	Percentage reduction in rate of infants visited.
1915	228	156	31·5
1916	204	132	35·4
1917	216	94	56·4
1918	248	145	58·8
1919	212	109	48·5
1920	212	156	38·6

MINETT (E. M.). **Infantile Mortality.**—*British Guiana Med. Annual for 1923.* pp. 148–150.

The infant mortality in British Guiana does not appear to differ very materially from that in other parts of the tropics, though there appears to have been a considerable reduction in the figures during the last few years, due to the Baby Saving League and to the health visitors appointed by the corporation. There are now 22 nurse midwives working throughout the colony. The writer quotes recommendations of a committee of the British Medical Association.

“1. That the effect of many of the causes of infant mortality can be lessened by the education of women at centres and in their homes.

“2. That the instruction of the elder girls at school in home craft and in mother craft should be developed and encouraged.

“3. That every effort should be made to improve the prospects of midwives, and that encouragement should be given to them by local authorities whenever there is difficulty in securing a sufficient supply.”

BARY (Helen V.). **L'hygiène maternelle et infantile à Porto-Rico et dans les îles Vierges.**—*Bull. Internat. de la Protection de l'Enfance.* Brussels. 1924. Mar. 31. No. 24. pp. 199–213.

ADAM (M.). **État de l'enfance aux colonies. [Afrique occidentale française.]**—*Ibid.* pp. 214–226.

VASSAL (Gabrielle). **Natalité et protection de l'enfance en Afrique équatoriale française.**—*Ann. d'Hyg. Publique, Industrielle et Sociale.* 1924. Jan. New Ser. No. 1. pp. 43–48.

The above three articles discuss the causes of infant mortality and the remedial measures necessary in Porto Rico and the Virgin Islands, in Dakar, the French African Colony, and in French Equatorial Africa.

ENCISO (Enrique). **Mortalidad infantil en Bogotá.**—*Repert. de Med. y Cirug.* Bogotá. 1923. Dec. Vol. 15. No. 3. pp. 144–152. With 3 text figs.

Infantile mortality in Bogotá is very high; in 1920 it was 220·52 per mille, and this was a favourable year in that there was no measles or whooping-cough. 41·64 per cent. of the births are illegitimate, and

the high death-rate is largely due to poverty, ignorance and neglect. The feeding is faulty, the milk supply is bad, and, as a result, the chief cause of death is gastro-enteritis. Pulmonary diseases rank second and closely approximate the former in those years in which measles and whooping-cough are prevalent. Records show that measles attacks Bogotá only once in every eight years, but when it does so the epidemic is severe and the death-rate high.

The remedies suggested are the giving of help to nursing mothers, the establishment of child-welfare centres, and the safeguarding of the milk supply.\*

SOUZA (G. H. de Paula). **Algumas considerações sobre a mortalidade infantil em São Paulo.** [Infantile Mortality in San Paulo.]—*Ann. Paulist. Med. e Cirurg.* 1923. Dec. Year 11. Vol. 14. No. 12. pp. 191–225. With 2 charts.

The infantile mortality rate in San Paulo is very high, 180 per 1,000. The chief causes are poverty and distress of parents, with the attendant factors of mal-nutrition, unhealthy dwellings, want of skilled assistance in childbirth, hereditary disease, and so forth. Diarrhoea and enteritis are noted as accounting for nearly half the total deaths (48·02 per cent.). The author rightly lays stress on the principle that measures for infant protection and welfare should constitute part of the general hygiene of the State, should start in pre-natal days and extend through birth and on to adolescence with continuity of action. The remainder of the paper is devoted to statistical tables relating to the various diseases registered as causes of death, under the various relevant systems.\*

## MEDICAL INSPECTION OF SCHOOLS.

SHARP (C. G. Kay). **Medical Inspection of School Children in Natal. A Brief Retrospect.**—*Jl. State Med.* 1923. Sept. Vol. 31. No. 9. pp. 437–438.

The writer gives some interesting figures of the results of inspection of schools in Natal in 1913. The percentages of sickness in the school of Durban are given as follows:—

“Adenoids, 35·5 per cent.; tonsils (much enlarged), 17 per cent.; eyes (defective vision), 3 per cent.; total defective children (all causes), 37 per cent. . . .

“In 1921, the following percentages of defectives were found amongst 6,500 school children examined by Dr. Mary Baird, Assistant Medical Inspector of Schools, and myself: Adenoids, 8 per cent.; tonsils (much enlarged), 9 per cent.; eyes (defective vision), 4 per cent.; nits, 4·6 per cent.; teeth (bad), 18 per cent.; total defective (all causes), 20 per cent.

“Zulus in training as teachers in the Native Training Colleges showed a defective percentage of 4 per cent. teeth and 11 per cent. defective eyesight.”

From the above it would appear that about 50 per cent. of the total disability has been removed owing to the work of the school medical officers.

\* Summarized by Dr. H. Harold Scott.

**PONS-LEYCHARD. Sur un essai d'organisation de soins dans les écoles d'Algérie.**—*Arch. Inst. Pasteur d'Algérie.* 1923. Dec. Vol. 1. No. 4. pp. 699-703.

Since 1922 and '23 special attention has been paid to the condition of the scholars in three selected schools in Algeria, at Montagnac, Lavyassière and Hennaya. Attention was concentrated on ringworm, trachoma and malaria. The children were very carefully examined and treated at school on the usual lines. At Hennaya, out of 326 boys and girls, 60 had enlarged spleens. Lessons in hygiene and the spread of these diseases formed part of the curriculum. The writer, commenting on the attitude of the people generally towards malaria, divides them into 3 classes, namely, (1) those who know the cause and combat it; a very small number, (2) those who know but do nothing (this class includes a very fair number of Europeans and a still smaller number of natives, mostly indolent and intensely fatalistic), and (3) those who are entirely ignorant; the great mass of the population.

## REPORTS AND STATISTICS.

**MINISTRY OF HEALTH. On the State of the Public Health. Annual Report of the Chief Medical Officer of the Ministry of Health for the Year 1922.** [NEWMAN (George).]—186 pp. 1923. London: H.M. Stationery Office. [Price 2s. 6d. net.]

"1. The number of births registered in 1922 was 780,124, which showed a decline of nearly 70,000 births on 1921, and 170,000 on 1920. The birth rate was 20.4.

"2. There was a death rate of 12.8, which is slightly higher than in 1920 or 1921. The expectation of life at birth is now 11 years greater for males and 13 years greater for females than it was 60 years ago.

"3. The infant mortality rate (77 per 1,000 births) is the lowest yet recorded in this country and indicates a saving of not less than 40,000 lives over and above the number that would have been saved had the average rate for 1901-10 continued. There is still much unnecessary loss of life both of mother and infant (particularly in the first month of infancy).

"4. The number of cases of epidemic and infectious diseases notified in 1922 was 422,955. Diphtheria, enteric fever, cerebro-spinal fever, encephalitis and tuberculosis showed a decline during the year; but measles, pneumonia and scarlet fever still remain high.

"5. There appear to be good grounds for believing that venereal disease, though not notifiable, has declined. Cancer, unfortunately, has substantially increased. The toll of respiratory diseases, diseases of the heart, diseases of the nervous system and tuberculosis still remains formidable. Deaths from these four diseases under 45 years of age are largely preventable. There is also a large mass of disability and physical and mental incompetency from relatively trivial sickness, much of which is neglected and this leads to more serious conditions in later life. The expenditure on sickness and disablement benefit and other similar returns denote that a very serious amount of time is lost in employment, amounting to not less than 375,000 years per annum for the insured population only. This is but an indication of the heavy claims which sickness makes upon the productive power of the nation year by year.

"6. The problem lying immediately before the Local Authorities responsible for the sound administration and practice of preventive medicine is, first, to rear and maintain a healthy race of people; secondly, to continue their attack upon infection and all forms of preventable sickness and invalidity; and, thirdly, to recognise that the public health is the primary asset of the nation's welfare, whether measured by employability and production or by length of days and personal well being."

*Ship borne diseases.*—Several cases of smallpox were imported during the year, a lascar from Bombay, an unvaccinated child from Canada and several of the crew of the ship "Odessa." The crew was paid off and some members contracted the disease after going ashore.

*Malaria.*—The steamship "Hunstanworth" returned from the west coast of Africa early in November. The master and several members of the crew had to be landed at Las Palmas suffering from malaria. On arrival at Sheerness on the 17th November all but two members of the crew were down with the disease. Two men died after reaching England and the remainder of the crew were treated in hospital, very seriously ill. The disease was contracted by carrying about 120 negroes up the river from Rufisque on the west coast of Africa.

The Norwegian vessel, the "Frey," arrived at Bristol with 20 cases of malaria aboard.

*Plague.*—The S.S. "Warwickshire" arrived at the port of London from Rangoon, landed her passengers and proceeded to Liverpool. At the latter port 23 dead rats were found in one of the aft holds. These were shown to have died from plague. No human cases resulted. It seems probable that the infection was taken on board at Colombo in some cocoanut fibre.

On March 26th the "City of Genoa" arrived from Karachi. Three deaths from plague had occurred amongst the crew on the voyage; no extension of the disease occurred.

The steamship "Elpinor" arrived at Liverpool from China. Rat trapping was carried out on board, one plague rat was caught.

The steam ship "Ardeola" arrived at Liverpool from Las Palmas. Rat searchers sweeping out the hold found 4 dead rats, which proved to be plague infected. The vessel was fumigated and 16 rats were found, 8 of which were plague infected. The cargo consisted mainly of bananas, tomatoes and potatoes.

The steam ship "Portia," from Rosario, which called at Montevideo, reported at Gravesend that an apprentice age 20 was taken suddenly ill and died, under circumstances suggesting plague, and was buried at sea. The vessel carried only grain. The Medical Officer of Health considered that the rats caught on board were plague infected. This was not confirmed by further bacteriological results.

The following large vessels have been recently fumigated with HCN in England. In one case there was an accident resulting in the loss of 2 lives. It seems rather doubtful how this took place, considering the precautions that were taken, especially as the men were provided with oxygen breathing masks, which were in perfect order:—

	Tons.		Tons.
Scythia ..	19,700	Berengaria ..	52,000
Baltic ..	23,900	Dakotan ..	8,000
Majestic ..	56,000	Aquitania ..	45,600
Adriatic ..	24,500	Mauretania ..	30,700

The accident occurred in the last-named vessel.



**AIR MINISTRY. Report on the Health of the Royal Air Force for the Year 1921.** [MUNRO (D.), Director of Medical Services.]—pp. iv+80. With 5 charts. 1923. Feb. Air Publication 934. London: H.M. Stationery Office. [Price 5s. net.]

The following interesting paragraphs are taken from the annual report of the Royal Air Force.

"*Sandfly Fever.*—Table 14 shows the monthly case incidence of sandfly fever in the geographical areas abroad in which it occurred during 1921, and also the corresponding ratios per 1,000 of strength during 1920. In Malta, while the yearly case incidence was slightly reduced, there was a higher case incidence in July and August than

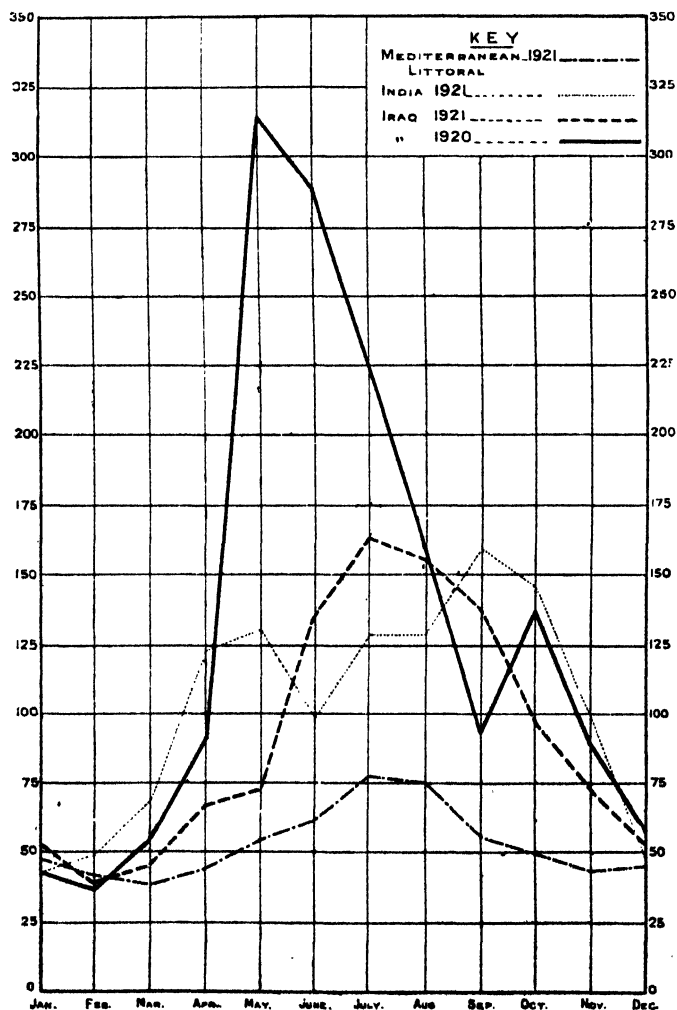


FIG. 50.—Chart showing monthly case incidence of sickness in ratios per 1,000 of strength of Royal Air Force personnel in geographical areas abroad for 1921 and for 'Iraq in 1920. (Cases of 48 hours or less duration are excluded.)

[Reproduced from *Rept. on the Health of the Royal Air Forces for the Year 1921*, by permission of the Controller of H.M. Stationery Office.]

in 1920. The second outbreak, in September, 1920, was absent in 1921. In Egypt and Palestine, the yearly case incidence is practically identical with last year, and the monthly case incidence in the two years calls for no comment. The very marked reduction of the case incidence in Iraq for 1921, compared with 1920, is shown in Chart 5, page 39. Table 13 shows the case incidence in stations abroad. Judging from the experience of the past few years, it would appear that the severity of sandfly fever outbreaks in Iraq vary markedly from year to year, and, consequently, it is impossible to say how much the lowered case incidence was due to the prophylactic measures taken. Apart from these measures, there were other factors which probably played their part in lessening the incidence of the disease. The type was undoubtedly milder than in 1920, and also the huts in that year were mostly new and had not had time to dry, thus possibly forming a more suitable *nidus* in which sandflies could live and breed. A bigger proportion than in 1920 of personnel had already spent one period of hot weather in Iraq. In practice, it is usually found that the disease is commoner and of a more severe type in personnel fresh to the country. General prophylactic measures such as regular spraying of quarters, application of preventive ointments, wearing of slacks after sundown, prevention of moisture near huts, covering of sumps, limewashing buildings both in spring and midsummer, placing beds towards the centre of rooms away from the walls, and, lastly, an adequate supply of overhead fans in quarters, have all undoubtedly helped to lower the case incidence. . . .

*"Heatstroke and Sunstroke.*—In practice it has been found that many cases have been reported by medical officers during the hot weather from Egypt and Palestine, Iraq and India, which were, in their opinion, undoubtedly caused by the direct, or less often the indirect, action of the sun's rays. Owing to their comparative mildness, however, these cases did not warrant the terms 'Sunstroke' and 'Heatstroke' as generally understood, being applied to them, the only diagnoses available in the official Nomenclature of Diseases. It was consequently decided to introduce the term 'Heat Exhaustion' to cover this mild type of case. The usual symptoms are comparatively slight pyrexia, dizziness, intense headache and pain in the back and limbs, accompanied by varying degrees of collapse. At the same time the attention of medical officers has been drawn to the fact that the term 'heat exhaustion' should not be used indiscriminately, as a simple method of diagnosing sudden pyrexias, which in many cases appear to be mainly due to constipation. In all cases where the term is used instructions have been issued that the previous history of the case should contain sufficient information to warrant the diagnosis of heat exhaustion being made. During the sandfly fever season heat exhaustion and sandfly fever cases are apt to be confused. The differential diagnosis rests mainly on the fact that sandfly fever cases show a leucopenia with a relative lymphocytosis in the early stages of the disease. The terms 'Heatstroke' and 'Sunstroke' together with their text book synonyms 'Insolation' and 'Thermic Fever' are now reserved for the variety in which the onset is sudden, usually accompanied by hyperpyrexia, with or without cerebral symptoms and unconsciousness. This classification was not in use during 1921 but will be used in future reports.

"During 1921, 82 cases occurred overseas, with 6 deaths. Twelve cases were reported from Egypt and Palestine, compared with 24 in

the preceding year. Thirteen were reported from Malta. Thirty-eight cases occurred in Iraq, with 3 deaths ; 18 cases, also with 3 deaths, in India. A single case occurred on board ship. . . .

*"Glare and Its Effects."*—Work carried out during 1921, mainly in India, appears to indicate that the glare of the tropics brings about a diminution in the range of accommodation, and lack of proper power of co-ordination of the extrinsic ocular muscles. These conditions in pilots lead to deterioration in landing capacity, more especially if defects in accommodation and ocular balance have previously existed. As mentioned in last year's report, the ordinary tinted glasses are useless, because they cause unnatural landscapes ; in fact, the average pilot usually removes them when landing. Samples of special Crookes' glass, U.B. and U.D. types, were issued to India and Egypt during the year, and the reports received were unanimously favourable. The two types vary only in degree of tint ; and it is interesting that in Egypt the darker type was preferred, while in India the lighter type was selected. This can be accounted for by the lighter colour of the ground (sand) in Egypt. Further quantities have been manufactured, and it is hoped that by universal issue to flying ranks, the effects of glare will be largely eliminated as a factor in bad landings."

**UNION OF SOUTH AFRICA. Department of Public Health. Report for the Year ended 30th June, 1923.** [MITCHELL (J. A.), Secretary for Public Health and Chief Health Officer.]—39 pp. 1924. Pretoria : Govt. Printing & Stationery Office.

"The financial stringency has also, in varying degree, affected sanitation and public health measures in most centres throughout the Union. Many local authorities have reduced their public health and sanitary staffs or have restricted their health expenditure in other directions. In a number of instances municipalities which previously had in operation a departmental system of night-soil and refuse removal, with duplicate night-soil pails, have fallen back on the old and unsatisfactory contract system, carried out with tank-carts and single pails, which, in the nature of things, are never properly cleansed or disinfected. These and similar retrograde movements are likely to have a definitely prejudicial effect on the public health of the urban population of the Union. It is a regrettable fact that in bad times expenditure and activities in connection with public health and sanitation are usually amongst the first to be restricted."

Enteric or typhoid fever.—"A serious epidemic, comprising some 129 European and 7 native cases, occurred in Durban during the four weeks ended 21st October. The cases occurred in all parts of the borough. There were facts and circumstances casting suspicion on both water and milk as vehicles of spread of the infection, but the cases were not localized to any area with a water supply from a particular source or confined to persons obtaining their milk supply from any particular dairy. The outbreak and all the circumstances connected therewith were carefully investigated by officers of the Department, in conjunction with the municipal health authorities, but it proved impossible to arrive at any definite conclusion as to the primary source of the outbreak. An important fact elicited by the investigation was the large percentage of natives employed in Durban dairies whose blood gave a positive reaction with the Widal test. Everything possible was done by the municipality and all concerned to arrest the outbreak and to prevent a recurrence.

"A very sudden and virulent outbreak occurred during November amongst the boarders and staff at St. John's School, Frere, Estcourt District. Out of a total of 50 pupils and 21 staff, 39 pupils and 13 members of the staff were attacked—all within a period of a week or so. The outbreak was investigated by local medical officers and health officer of the Department; the infection is believed to have been conveyed to the school by a person from Durban, and its rapid spread was probably due to the specific contamination of food stuffs.

"In January and February a small outbreak (9 cases) occurred at the Kaalplaats Diamond Diggings, near Vereeniging. The arrangements hitherto in operation for maintaining reasonable cleanliness and sanitation in alluvial diamond diggings have been very unsatisfactory; it is, indeed, somewhat surprising that outbreaks of enteric and other filth diseases at such diggings are not more frequent."

Malaria.—"In the malarial areas of the northern Transvaal the types of inhabitants and the living conditions may be grouped into three classes:—

"(a) The well-to-do European rancher, who has his residence at a good distance from water-courses or collection of water, recognizes the danger of malaria, and takes proper precautions; he, his family, and native employees usually suffer little.

"(b) The European settler, more or less of the 'poor white' class, who is totally ignorant of malaria prophylaxis, and who prefers to live as close as possible to the domestic water supply and his irrigation furrows; the incidence of malaria is particularly severe among people of this type and amongst their native employees.

"(c) Natives under kraal and tribal conditions (far outnumbering the European settlers and the natives on lands owned by Europeans) living in areas specially reserved by Government for their occupation. Malaria among these is severe during exceptional seasons, and owing to the configuration of the country they cannot easily avoid the disease by temporarily shifting their residence. The incidence of the disease is not, however, so severe among these natives as among the settlers of the 'poor white' type and the native employees resident on their farms."

Plague.—"A survey of the surrounding country to a radius of about a hundred miles from this focus of infection was then made, and the results charted. It has been found possible for trained rodent inspectors to make rapid surveys of this kind by going over the country, noting the presence or absence of surface indications of gerbilles and other wild rodents, and the proportion of deserted burrows—the surface observations and deductions therefrom being from time to time checked or verified by excavations and the finding of remains of rodents. Our experience indicates that extensive mortality in gerbille colonies can be safely attributed to plague; no evidence of any other fatal epizootic disease among them has so far been discovered. Useful information can also be gained by examining the excreta of the yellow mongoose (*Cynictis pencilata*). This animal, which, like the suricat, is not a rodent but a carnivore, lives on friendly terms with the gerbilles and does not attack them so long as they are healthy, but it kills and devours the sick and eats the carcasses of dead gerbilles. Under natural conditions it appears rarely, if ever, to contract plague. Its usual food consists of insects, lizards, small snakes, birds' eggs, etc. Where a mongoose has devoured dead gerbilles, its excreta show the fur of these animals; furry mongoose dung has come to be regarded

by our plague staff as strongly suggestive of sick gerbilles and plague. The time which has elapsed since an outbreak of plague has overtaken a gerbille colony can usually be estimated from the appearance of the excreta and burrows, the amount of denudation of the mounds of earth, and the growth of vegetation thereon. . . .

"Observations and experience during these surveys point to the conclusions that during the spread of plague amongst wild veld rodents the heaviest mortality is amongst gerbilles (*Taterona lobengula*) and multimammate mice (*Ratus coucha*) ground-squirrels [*Xerus* (*Geosciurus*) *capensis*] being only occasionally infected, and that common water-rats (*Otomys irroratus*), mole-rats (*Cryptomys*) and Eastern Karroo rats (*Barotomys luteolus*) rarely show mortality, except when living in close proximity to infected gerbille colonies. In some parts surveyed, Eastern Karroo rats were very numerous; it is a fortunate circumstance that under natural conditions plague does not readily spread amongst them. It has been found that spring-hares (*Bedetes caffer*) disappear from an area concurrently with a plague epizootic amongst gerbilles; up to the present none of these animals have been found definitely plague-infected. Several dead white-footed rats (*Mystromus albipes*) have been found in the vicinity of plague-infected gerbille burrows. There is evidence from two or three localities that rock-rabbits or 'dassies' (*Procarvia capensis*) have been seen dead and have disappeared from places where they had been numerous for years, concurrently with plague in gerbilles; up to the present, none of these animals have been found plague-infected. Ground squirrels and suricats (*Suricator suricator*) die out during a wave of infection concurrently with the gerbilles, but do not appear to play important rôles in spreading or perpetuating the infection.

"Our experience goes to show that, although the original agent in conveying plague-infection from the domestic rat to the wild fauna was probably the striped mouse (*Arvicanthus pumilio*), the animal of greatest importance in perpetuating and spreading the infection amongst the wild rodents of the Union is the gerbille. It is to be noted, however, that wherever these animals exist in numbers, multimammate mice, ground-squirrels, and spring hares are, as a rule, also common; the conditions of soil, herbage, and insect life which favour any one of these species favour all. Evidence of recent infection is easier to find, and in actual practice is more frequently found, in gerbilles than in any of the other animals mentioned. Gerbille burrows are easily located, and the animals frequently die in their burrows. Animals of the other species mentioned usually die in the open and their carcasses are in most cases quickly eaten or carried off by mongoose, suricats, wild cats, or birds of prey, or covered up and disposed of by ants."

**KHARTOUM. Report on the Health and Sanitation of Khartoum, Khartoum-North & Omdurman for the Twelve Months ending September 30th, 1922.** [BOUSFIELD (L.), M.O. of Health, Chief Sanitary Officer.]—42 pp. With 3 folding charts. Khartoum: Sudan Printing Press.

In the year under report an epidemic of malaria, which comprised about 10,000 cases, occurred in the city of Khartoum and neighbourhood. Out of 1,367 notified cases, 1,071 were considered to be local infections. At least 1,000 of these occurred in September. During the year the rainfall was in the neighbourhood of 400 mm., whereas the average for 20 years was only 120, and there were extensive flooded

areas, a quarter of Khartoum being under water for 2 or 3 weeks at a time. The mosquito which caused the outbreak was *A. costalis*. The mortality from malaria itself does not appear to be very high, only 7 deaths, or 5 per cent. of the number of cases notified, but the recorded deaths in August for the town and neighbourhood were 212 and 458 in September, making a total of 670, against the average mortality of about 300. Most of the deaths occurred amongst young children and elderly people.

Communicable Diseases Notified.	Civilian.	Egyptian Army.	British Troops.	Imported.	Local.	Total.
Malaria (including B.W.F.) ... ..	679	200	192	296	1,071	1,367
Small pox ... ..	45	2	—	22	47	69
Typhoid and Paratyphoid ... ..	5	3	—	3	8	11
Dysentery ... ..	28	15	2	16	45	61

An interesting chart is given of the rainfall, the number of all anophelines found and the total primary malarias, which we are unable to reproduce.

"It will be noted that the crest of the rainfall is some 3 weeks before the crest of the prevalence of adult anopheline mosquitoes, while the anopheline infestation crest in the municipality occurred a week before the highest crest, the higher crest being due to the number of infestations discovered when the outlying districts could be dealt with, while the crest of the malaria wave occurred 8 weeks after the rainfall crest and 4-5 weeks after the adult mosquito anopheline infestations crests."

As regards climatic conditions :—

"From July 18th to August 30th the relative humidity was usually well over 70, reaching 100 on August 28th.

"From August 30th to October 28th, it fell and was usually below 60, while from 22nd October to the end of November it was usually well below 40.

"The maximum temperature ranged between 90°—95° F. during August, and about 100° F. in September and October, falling some 5 degrees during November. . . . .

"The rapid fall in number of cases is thus about 12 days after the relative humidity reached 40 or below, and this period we may roughly take as the incubation period of malaria. . . . .

"The following deductions so far appear to be correct under local conditions.

"(1) Multiple breeding places in a controlled area are essential for an epidemic.

"(2) Relative humidity at or above 60 is also necessary for great mosquito production and for the carriage of malaria to any degree.

"But malaria can be carried when the relative humidity only reaches 32-35 for several successive months, even occurring with a relative humidity of only 10. Latent malaria has to be considered in this connection and previous prophylactic quinine."

[The evidence for this statement is weak and it opposes other authorities.]

"(3) A mean maximum temperature of between 85-100° F. is suitable for carriage of malaria, but 23 primary malarias occurred in the month with mean maximum temperature of 105·4° F. with a mean minimum of 91° F., and 11 in a month with mean maximum of 106·2° F. with a mean minimum of 93° F.

"(4) The nearer the ratio of anopheline to culex reaches parity in August, September, October and November, the more likelihood of an epidemic, but this in no way holds good for the first 5 months in the year, when parity is often reached or the ratio of anopheline infestations exceeds those of culex.

"(5) Culex infestations run up rapidly in June and July with the commencement of the rains, reaching their maximum usually in August far outnumbering the anopheline. The anopheline increase is usually in September, in bad years earlier.

"The culex increase starts quite a month earlier than the anopheline.

"These deductions are based on purely local figures and the anopheline is practically exclusively the *Pyretophorus costalis*."

**NIGERIA. Annual Medical and Sanitary Report for the Year 1922.**

[MONTGOMERY (H. B. S.), Acting Director, Med. & San. Service & CAMERON-BLAIR (M.), Deputy Director, San. Service.]—76 pp. 1923. Lagos: Printed & Published by the Govt. Printer.

The writer of the Sanitary Report gives an interesting account of the work done during the year. The following extracts give an idea of the document as a whole.

"In 1901, the Europeans at Lokoja were housed in wooden bungalows resting on iron pillars, which latter, in their turn, were bolted on the top of cemented brick pillars rising from the ground. The iron pillars, halfway up their length, were collared with iron bands, presenting on their upper surfaces concave rings surrounding the pillars. Those circular concavities were kept full of water in order that white ants might be barred from the wooden bungalows. The white ants were barred all right, but the water in the concave rings swarmed with mosquito larvae; as things were, it was impossible to assure the regular oiling of the water in the rings; the chronic loss of service among the Europeans (both civil and military) caused by incapacity due to malarial fever was little less than 50 per cent.; the cause of this was fully represented, but it took months of medical agitation to secure the filling in of the iron rings with cement. Further south, some years later, the present reporter encountered living in a bungalow raised on pillars from the grounds a well-known and widely respected European who permitted his house-boys to use habitually the surface of the ground under his bungalow as a common latrine without reprimand or protest. About the same time, there were known to the reporter respectable African coast natives who permitted their wives and children to leave their entire dejecta standing within chamber-pots within their houses for days 'on end without removal, the chamber-pots being not even covered. As time went on, conservancy became gradually effective, so also did anti-mosquito measures; more attention was devoted to the quality of water-supplies; town markets were more closely supervised; and the racial distribution of the population of stations was regulated. Progressive improvement followed all this; so much so that many years ago it had become possible to formulate this rule, to wit: 'Sanitary measures may be pronounced successful when it can be said of a station that the majority of its sick are importations from without and not habitual inhabitants of the station itself.' . . .

"Much sanitary progress can be, and has been effected among the higher tribes, who live under relatively high forms of administration. This is true of the people (of many of them, anyhow) who live under the

**Alafin of Oyo :** it is also true of the people living under the Northern Emirs, and of those living under a good many smaller independent magnates.

"Examples of progress effected among numerous groups of such people since the beginning of the century are as follows :—(1) Effective isolation of their sick relations and dependants whom they know to be suffering from infectious disease ; (2) Application of the usual preventive measures against mosquitoes and flies ; (3) Setting out new towns for themselves on reformed lines suggested by political, medical, or sanitary officers ; (4) Active measures taken for the safeguarding of their water-supplies ; (5) Willingness to reform their methods of disposing of human and other ordure and of getting rid of rubbish, when the wisdom of doing so is proven to them ; (6) Taking active part in the pushing of vaccination ; (7) The setting-up of extra-mural markets and caravansaries ; (8) Keeping long crops away from their compounds, and sometimes pushing them out well beyond the town boundaries as well. . . .

"European food is now procurable from Cold Storage at Lagos, at Calabar and Port Harcourt, and it may be realised that the innocent African may be safely trusted to keep his own end up when it is mentioned that although the Nigerian coast, rivers and streams teem with excellent fish it is, not infrequently, cheaper to buy salmon or turbot from the Cold Storage Company than to purchase fresh fish from the markets.

"The setting-up of aerated water factories and of ice-plants is slowly but steadily extending. All this must be reported as progress. But the physiologist—and, a fortiori, the pathologist—cannot regard such progress as more than a mixed blessing. In Nigeria as in the tropics generally, most Europeans eat and drink more than is good for them : unusual facilities for procuring abundant food and drink augment this proclivity and bring about chronic over-absorption in many individuals. It is for this reason that the proverbial "West African Chicken" has been and remains an unmixed blessing : its ubiquity renders it an unfailing source of supply, while its toughness and indigestibility defy over absorption, with consequent overloading of the system."

**SIERRA LEONE. Annual Medical and Sanitary Report for the Year 1922.** [BERINGER (F. J. A.), Director of Med. & San. Services ; PEACOCK (W. H.), Acting Deputy Director, Sanitary Service.]—75 pp. With 3 figs. 1923. Freetown : Govt. Printing Office.

	Population 1921 Census.	Birth Rate.	Death Rate.	Infantile Mortality Rate.
Freetown ... ..	44,142	16·9 per 1,000	26·3 per 1,000	418
Colony other than Freetown ... ..	41,021	20·2    ,,	21·2    ,,	217

### *Malaria.*

"House to House Inspection.—92,642 inspections of houses and compounds were carried out during the year, resulting in the discovery of 373 mosquito breeding places. 373 prosecutions followed, with convictions in 330 cases. The convictions realised £81 6s. 6d. in fines, making an approximate average of 4s. 11d. per case."



Twenty wells were closed down during the year. The number remaining untreated is doubtful. *A. umbrinus* was found breeding in one place in Freetown; its origin remains a mystery, as it is not a well-known local species.

Prof. BLACKLOCK, of Sir A. Jones' laboratory, made investigations into the diet at the Freetown jail and came to the conclusion that the outbreak of beriberi was due to the overcooking of food and the deterioration of rice by age and storage. There were 12 deaths during the year amongst the prisoners, which brings the death rate from this disease up to 43·5 per cent. Tailors in Freetown appear to be more susceptible to beriberi than other traders.

The report contains an article by Prof. BLACKLOCK on the prevalence of tsetse flies in the neighbourhood of Freetown. The conclusions arrived at are given below:—

"1. The breeding grounds of *Glossina palpalis* are not so strictly limited to the immediate vicinity of water as has hitherto been thought, they may occur quite independently of fresh water and at least a quarter of a mile from sea water.

"2. Although *Glossina palpalis* is to be found in considerable numbers in mangrove swamps and may travel in these to a distance of at least half a mile from dry land, the swamps do not constitute a breeding ground of the fly.

"3. The pupae of *Glossina palpalis* do not hatch when subjected to daily flotation on sea water.

"4. The ground around the trunk of oil palms (*Eloeis guineensis*) which have not been stripped of their lower petioles constitutes an excellent breeding place for *Glossina palpalis*.

"5. *Glossina palpalis* can breed in localities in which, practically, the only tree is the oil-palm.

"6. Stripping the oil-palm of the lower petioles would suffice to destroy the breeding ground in such localities."

**KENYA COLONY & PROTECTORATE. Annual Medical Report for the Year ending 31st December, 1921.** [GILKS (John L.), Principal Med. Officer.]—175 pp. With 4 figs. London: Printed by Waterlow & Sons, Ltd., London Wall.

The year 1921 was a highly satisfactory one as regards epidemic disease. There was an outbreak of smallpox on the Tana River; statistics in that part of the world are extremely vague, but probably about 200 deaths occurred. Two undoubted cases of kala-azar occurred in the country, one in an askari's wife; both cases came from the northern frontier, between Kenya and the Soudan. A few cases of typhus continued to occur in the Colony. The King's African Rifles Medical Service has been reorganized during the year. Probably the most important event is that a Public Health Bill has received assent and is now in operation. From this we quote the following paragraphs:

"The Ordinance states that 'there shall be for the Colony and Protectorate a Department to be known as the Medical Department, which shall be under the control of the Principal Medical Officer, and the functions of the Department are specified to be as follows:—

"'To prevent and guard against the introduction of infectious diseases into the Colony and Protectorate from outside; to promote the public health and the prevention, limitation or suppression of infectious, communicable or preventable diseases within the Colony and Protectorate, to advise and direct local authorities in regard to

matters affecting the public health ; to promote or carry out researches and investigations in connection with the prevention or treatment of human diseases ; to prepare and publish reports and statistical or other information relative to the public health, and generally to carry out, in accordance with directions, the powers and duties in relation to the public health conferred or imposed by this Ordinance.'

" The Ordinance is comprehensive, and such matters as administration, notification, prevention and suppression of infectious diseases, venereal diseases, the Regulation of Ports, leprosy, prevention of smallpox and the prevention and destruction of mosquitoes are dealt with in full and will require but little elaboration by regulations, while in Part IX, ' Sanitation and Housing,' it is laid down in detail what acts or things may be considered to be nuisances and powers are conferred with regard to the abatement of the same, not only in townships, but wherever they may occur. With regard to most matters, however, the Ordinance is not detailed, but instead wide powers are conferred on the Governor with regard to the promulgation of regulations. . . .

" The general duties of local authorities are laid down in Section 14, which is as follows :—

" ' It shall be the duty of every local authority to take all lawful necessary and under its special circumstances reasonably practicable measures for preventing the occurrence or dealing with any outbreak or prevalence of any infectious, communicable or preventable disease, to safeguard and promote the public health, and to exercise the powers and perform the duties in respect of the public health conferred or imposed on it by this Ordinance or by any other law.'

" This section marks progress. Previous to its enactment there is no evidence to be gathered from the laws of the country that the care of the public health of an area was incumbent on any local authority save, perhaps, in the case of a Municipality. Powers there certainly were, but no duties had been laid down or obligations imposed."

*Plague.*—" With regard to the incidence of the disease in rats, it is worthy of note that at the Government station of Kakamega no month passed without one or more plague-infected rats being found in some part of the station."

The report gives some extremely interesting details concerning the rats of the colony generally, particularly the northern portion of the Kavirondo country.

" The results of the rodent survey in North Kavirondo may be summed up as follows :—

" It was found that in the huts in the north-eastern part of the district, i.e., in that portion towards Mount Elgon, there were no black rats but only the ' multimammate.' In that portion of the district no cases of plague have yet occurred.

" Further south, towards Kisumu, and further west, towards the lake-shore, both kinds of rat were found in the houses, while still further south and west the ' multimammate ' rat was found to have disappeared, and the only domestic rat was the black one. It would appear that in this district the black rat is slowly extending his domain, taking his disease of plague with him as he goes. In certain parts of North Kavirondo his advent is so recent that plague is as yet unknown, further south the first advent of plague and the previous invasion of the district by the black rat are still remembered. Nearer Kisumu the advents of both have been forgotten.

" Little more is definitely known with regard to the arrival of the disease in the Lake Basin than that it was there before the Railway reached Kisumu. It may have been there for centuries. It may have arrived *via* the Nile. The route by which the black rat arrived in East Africa is equally unknown, nor do we know whether he was the rat that originally brought plague to the shores of the Nyanza. All that is certain is that he has been in Kisumu for many years (but whether before the advent of the Uganda Railway or not is also unknown), that he has gradually spread throughout the Central Kavirondo district, and is now spreading over North Kavirondo, and that he is, so far as Kenya generally is concerned, the only rat associated with plague. He is also the rat of the Nairobi and Kiambu districts, and, according to native accounts, is not the original domestic rat in these areas. Twenty years ago they did not know of him. They say he came from Nairobi. He may have reached Nairobi either from Mombasa or from Kisumu, and plague also may have come with him to Nairobi from either of these two places."

With regard to the rat fleas of Kenya, the following points are noted:—

" (a) The commonest rat fleas in Kenya would appear to be *X. brasiliensis* and not *X. cheopis*.

" (b) *X. brasiliensis* would appear to be capable of transmitting plague from rat to rat and from rat to man, as at Kabete in the Kyambu Reserve it was practically the only flea recovered from black rats caught in huts in an infected area.

" (c) *X. cheopis* not infrequently occurs in the towns of Mombasa and Nairobi, and in and around the Government Station and trading centre of Kakamega in North Kavirondo, where considerable outbreaks of plague have occurred. On the other hand, *X. cheopis* appears to be rare in the Kikuyu Reserve (Kabete), where cases of human plague have only occurred in a more or less sporadic fashion, and is a very rare parasite of the domestic rat (the 'multimammate') of North Kitosh, where plague has not yet occurred. Further, *X. cheopis* is but an infrequent parasite of field rats, none of which have so far been found to be infected with plague in this country.

" (d) It is only as a parasite of the black rat that *X. cheopis* is of more than infrequent occurrence."

*Sleeping sickness.*—An increase seems to have resulted from the gradual return of the population to the deserted parts. The question now arises as to what is to be done in the future with regard to sleeping sickness. Is an effort to be made to control its spread and to treat sufferers from the disease or are things to continue as at present, with the constant danger of an epidemic? There is no doubt that the wise and humane course is to endeavour to obtain some sort of control of the disease. In the past anti-trypanosomiasis measures varied from removal of the whole population to complete absence of measures of any kind. It has been shown in the recent anti-plague campaign in some areas that satisfactory results were obtainable with energy and a carefully prepared scheme of propaganda. The Principal Medical Officer is of the opinion that such measures as providing hospitals nearer the area would have considerable influence on the disease.

7,400 cases of yaws were treated in certain parts of the Colony against more than 500 of last year. This does not include the numbers treated by the missionaries.

A great deal of work has been done in the laboratory, such as preparing vaccine, agglutination tests, etc. As regards the water supply of Nairobi from the bacteriological point of view, it shows periodical and continuous contamination, though the medical examination reveals no change, and so far no outbreaks of water-borne disease have been directly or unmistakably traced to the consumption of water supply.

There is an interesting account of an outbreak of septicaemic and pneumonic plague, which will be dealt with elsewhere.

**MAURITIUS. Annual Report on the Medical & Health Department (1st January to 31st December 1922).** [GILCHRIST (T. B.), Director.] —22 pp. [No place or date of publication.]

"The estimated population of the Colony on 31st December, 1922, was 377,594 . . .

"The birth rate was 37 per 1,000, against 38·1‰ the year before, and an average of 36·2 for the five-year period 1918-1922 . . .

"The death rate was 34·5 per 1,000, compared with a death rate of 40·3 per 1,000 for 1921 and 42 per 1,000 for the preceding quinquennial period."

*Enteric Fever.*—"It will be . . . easily understood that [with] cases of enteric fever occurring in slums, densely populated, often without proper latrine accommodation, or supervision, and oftener, where latrines are badly constructed, and pails defective, and where the night soil service is badly performed, and [where] owing to [the] present system of dealing with 'Engrais,' . . . discharges are returned to the fields in less than six weeks, . . . late notification and existing conditions prevent the Medical and Health Department from combating the disease in a prompt manner.

"Investigations, bacteriological and chemical, of water supply showed that the supply from Grand River was grossly polluted, and investigations along the whole route convinced me that the causative agent was impure water; so notices were published through the press (all newspapers) of the danger of drinking unboiled water."

*Water supply.*—"Improvement of the quality of water supply is, in my opinion, the most urgent sanitary reform required here."

*Ankylostomiasis.*—"The campaign opened on 16th May on arrival of Dr. Hampton, the representative of the International Health Board.

"Owing to lack of a proper Soil Sanitation Campaign, the work was confined to the schools in and around Port Louis and to the prisons at Port Louis and Beau Bassin.

"Much propaganda work of an educational nature was accomplished; 49 public lectures, as well as conferences, were held during 1922.

"12,643 persons were examined and treated for Hookworm. Literature was widely distributed, including 325 letters, 9,000 pamphlets and 1,688 notices.

"Moka District was selected as the area for Treatment Campaign.

"After investigation as to the best means and type of closet most likely to be suitable for the population, Pit Latrines were adopted, where possible, the Government supplying concrete slabs for same.

"Up to end of December 500 pits had been dug."

**MALTA. Report on the Health of the Maltese Islands during 1922.**

[CRITIEN (A.), C.G.M.O. and Superintendent.]—48 pp. 1923.

July 31. Valletta, Public Health Office.

## Summary of vital statistics for 1922.

Area	...	...	...	...	{ Malta ... sq. miles ...	94·870
					{ Gozo ... sq. miles ...	26·974
Calculated Civil Population	...	...	...	...	{ Malta ... 195,089	218,510
					{ Gozo ... 23,421	
Density	...	...	...	...	{ Malta ... persons per	2,056·3
					{ Gozo ... sq. mile	
Marriages recorded in Public Registry	...	...	...	...	{ Malta ... 1,158	1,291
					{ Gozo ... 133	
Birth-rate per 1,000—Civil Population	...	...	...	...	...	36·41
Crude death rate (all causes) per 1,000—Civil Population	...	...	...	...	...	23·74
Average crude death-rate for previous five years	...	...	...	...	...	22·68
Number of deaths of children under 1 year of age to every 1,000 live births	...	...	...	...	...	261·87
Death-rate from notifiable infectious diseases per 1,000—Civil Population.	...	...	...	...	{ Malta ... 2·10	2·03
					{ Gozo ... 1·45	

"*Undulant Fever*.—During the calendar year, 1,102 attacks of undulant fever were reported, viz. : 984 in Malta and 118 in Gozo, against 710 cases in the preceding twelve months. The fatality rate was 5·3 per cent. of the deaths—59 in all—two-thirds occurred at ages 15–45.

"The above figures show that out of every 200 inhabitants of these Islands one contracted the disease during the comparatively short span of twelve months . . .

"The indifference of many to the contraction of a long serious illness affecting men and women during the most useful and productive period of their lives is a cause of serious anxiety. As we have affirmed repeatedly on previous occasions, there is no other disease against which we can protect ourselves more easily and effectively than undulant fever, if only people will not use milk unless previously boiled. If safety were not within everybody's reach perhaps one would understand the reckless attitude taken by so many in this respect. It is the fetish of the unboiled milk. Milk when boiled does not lose any of its nutritive value ; if anything, its value as food is increased. It is also a fact that boiling makes milk a reliably safe and wholesome article of diet for infants and adults alike. Carelessness in this respect is criminal, as our health and life and material interests, together with the well-being of all who are dependent upon us, are staked for no immediate or remote benefit."

**COLOMBO, Municipality of : Report of the Medical Officer of Health for the Year 1922.**

[PHILIP (W. Marshall), Medical Officer of Health.]

—47 pp. With 10 charts, 1 graph, 4 figs. &amp; 6 maps. Colombo : Municipal Printing Office.

As usual, this report is an extremely interesting document ; in fact, one of the best that we see.

"The health of the town was, on the whole, satisfactory, the death-rate, corrected for deaths of non-residents which occurred in the hospitals, being 28·8 per 1,000, which is the same as in the previous

year; but for the fact that influenza showed marked signs of recrudescence and caused an increased mortality from pneumonia and other diseases, the general death-rate would undoubtedly have been one of the lowest on record. There was a decrease in the mortality from practically all the preventible diseases, including enteric fever, dysentery, diarrhoea, phthisis and plague.

"The question of autochthonous or locally acquired malaria was investigated at considerable length during the year, as there was an impression abroad, which appeared at first sight to be supported by the hospital records and the experience of medical practitioners, that this disease was being acquired to a large extent within the town. This was, however, found upon investigation to be erroneous. There was, it is true, a marked increase of cases under treatment in the town; but with the exception of a comparatively small number of sporadic cases, these were found to have been infected in other parts of the Island where malaria was unusually prevalent. This conclusion is supported by the evidence of Mr. Carter, the Government Malariologist, who, as the result of an extensive investigation, including the spleen examination of 3,468 children within the town, has recorded his opinion that 'Colombo, and in fact the greater part of the Western Province, must be considered remarkably free from Malaria.' He found the spleen rate within the Municipality to be only 0.69 per cent., which is practically negligible. In this connection attention must unfortunately be drawn to a sensational, misleading, and incorrect leading article which appeared recently in Vol XIX, Part III, of the Journal of the Ceylon Branch of the British Medical Association, which, being the journal of an association of medical men, cannot be permitted to remain on record unrebuted."

Malaria of the town when indigenous appears to be due to the occasional presence of *Anopheles culicifacies* and *listoni*; *A. sinensis* is very common and probably does act as a carrier in certain cases, but it has never been found infected. The former two species are on the whole distinctly rare in the town.

*Enteric.*—As regards enteric fever the medical officer of health gives some extremely interesting and important figures. It would appear that the death rate from this disease in Colombo is nearly always 30 to 40 per cent. of the reported cases; this is obviously nearly double what it is elsewhere, and there is no reason to believe that this malady is more virulent in Colombo than in other parts of the East. Consequently, the conclusion is that for 179 recorded deaths with the usual death rate of 15 per cent., there must be at least 1,193 cases in Colombo instead of 498, as reported. Therefore, 695 cases of enteric fever have never been notified at all. Classifying these figures according to races it would appear that about 450 are amongst Singalese and about 100 amongst Tamils, the other communities providing the small quota. A spot map of the disease shows that it is very prevalent in the crowded areas and comparatively rare in the better parts of the town. The disease diagnosis is simple continuous fever, and also follows a very similar distribution. Consequently, there can be little or no doubt that these deaths are due to enteric. There is no seasonal variation in the number of cases in Colombo; consequently it is obviously not connected with the water supply, and is probably spread by personal contact. When one considers the conditions under which the disease exists there must be a large number of true carriers and ambulatory cases in the city which are extremely difficult to deal with.

*Plague* —There were 136 cases with 131 deaths.

"Early in November information was received from the manager of a large forage store in Slave Island that a number of his workmen were absent, some of whom were stated to have died suddenly in their homes in various parts of the town. The investigation which was immediately instituted on receipt of this information disclosed the following facts. An outbreak of unusually virulent plague had suddenly appeared amongst the rats at this forage store, and had, prior to receipt of the information about the human cases, practically wiped out the local rat population, no fewer than fifty-eight dead rats being found by the Public Health Department staff under the bags of forage. On moving this forage, close to which, and in fact amongst which, the workers had been engaged, the floor was seen to be alive with fleas. A dead squirrel which had apparently come down on to this floor from an overhanging tree in search of particles of grain, and was found in the possession of a cat, also proved to have died of plague. An adjoining forage store and some tenements had also been invaded, and seventeen rats killed by the disease. The numerous fleas, thus deprived of their natural rat hosts, then attacked the human occupants while they were at work during the day time, with the result that six known cases occurred, in addition to which there were three other cases amongst the workers who had previously been attacked, died, and buried on death certificates giving other and unquestionably incorrect causes of deaths, making a total of nine human cases, all of which proved fatal. The unusual virulence of the infection in this small outbreak was confirmed by Dr. Hirst by animal inoculation as previously stated.

"While this investigation was going on, two cases of human plague occurred at Borella, which upon investigation proved to be of the same type as the Slave Island cases, and although the actual mode of transmission could not be ascertained there appears to be no doubt that it had been derived from the same source. It is, perhaps, unnecessary to say that in the face of such a dangerous type of plague as this there was no relaxation in the matter of searching for cases and carrying out preventive measures, and it is believed that no case escaped detection after the commencement of the investigation.

"The conclusion arrived at in regard to this outbreak was that a new and unusually virulent strain of bacillus pestis had reached the town amongst the imported forage, which was obtained for the most part from India, although a certain amount was said to have come from Australia.

"In this connexion Dr. Hirst's conclusion that *X. cheopis*, the plague flea of India, is being constantly imported here from India, is of great significance, and calls for the introduction of the special preventive measure recently recommended, viz., fumigation at the port, with cyanide gas, of all grain and forage imported into the Island.

"Subsequent to the outbreak described above, the same type of disease was found amongst the rats in other forage stores and premises adjoining such stores, but, fortunately, no human cases occurred there as thorough preventive measures were at once adopted."

The case mortality was 96.7 per cent. The disease was extremely virulent and there is good reason to believe that practically all cases were reported.

In the Appendix there is a valuable report by Dr. HIRST on the plague research work done in the Municipal laboratory. A great deal

of the work has already been published in scientific journals, so that it is unnecessary for us to deal with the whole of this valuable contribution. Some points, however, are worthy of note.

"130 specimens of the musk "rat" *Crocydura coerulea* were brought to the laboratory. This insectivore is practically immune to plague. Strictly speaking, it should not appear in the plague returns.

"List of rodents found in Colombo by officers of Sanitary Departments :—

**FAMILY MURIDAE.**

**Sub-family Gerbillinae.**

**Species** *Tatera Ceylonica*.—The Ceylon gerbil. Fairly common around Colombo, found on the Galle Face.

**Sub-family Murinae.**

**Species** *Bandicota malabarica*.—The Malabar bandicoot. Common in gardens.

*Gunomys gracilis*.—The Ceylon mole rat. Common around Colombo in gardens, paddy fields, etc.

*Rattus rattus Kandiannae*.—The Ceylon house rat. The common bungalow rat.

*Rattus rattus rufescens*.—The Indian house rat.

*Rattus rattus nemoralis*.—The large Ceylon tree rat. Only a large form of the last species.

*Rattus rattus alexandrinus*. } Ship and sewer rats. Fairly  
*Epimys norvegicus*. } common round the docks and  
not indigenous.

*Mus dubius*.—The Indian house mouse. The common mouse.

*Leggada booduya*.—The Southern field mouse. A small white bellied field mouse which should be found in the paddy fields around the town.

As regards the work on *X. Astia*, "an analogy from the epidemiology of malaria may help to elucidate the idea. Till recently Colombo was practically free from malaria-carrying mosquitoes, and also from indigenous malaria. The mosquitoes now present may be represented by three types. *Anopheles culicifacies* or *listoni*, which are dangerous carriers associated with epidemic malaria ; *A. rossii*, which have never been proved to carry the disease, and *A. sinensis*, which only carries it occasionally under particularly favourable conditions. *X. cheopis* corresponds to *A. culicifacies*, *X. astia* to *A. rossii*, and *Eulex hominis* to *A. sinensis*. . . .

"The full range of hosts which *X. astia* can parasitize is not yet known. It is certainly found on many Ceylon rodentia, including all those in the list given above, and on some insectivores, such as the 'musk rat' *Crocydura coerulea*. It seems certain, however, that *X. astia* is not adapted to such a great variety of hosts as *X. cheopis*, nor is it likely that its distribution is nearly so cosmopolitan as this well-known plague-carrying flea.

"It is probable that it ranges less widely in search of food. The bionomics of *X. astia* have not been investigated in great detail for lack of the time necessary for exact observations. Under average conditions the egg hatches out in about three days, the larval stage lasts about a fortnight, and the adult emerges from the cocoon about the 26th day from the laying of the egg. Very few eggs are laid, or larvae hatched out during the hot, dry weather.

"Its activity increases as the atmospheric temperature falls within the range 80° F. to 70° F, but its average length of life seems shortened at the cooler temperatures prevalent up-country. At high



temperature, 85° F. and over, the flea becomes inert and sluggish in its movements.

"In the months of December and January it may live as long as ten days without feeding or even longer if newly bred. In hot and dry weather *X. astia* like *X. cheopis*, requires frequent meals of blood to enable it to survive for any length of time.

"A comparison between the proportion of *X. cheopis* and *X. astia* found during the hot and cool weathers in Colombo shows clearly that *X. cheopis* is more unfavourably affected by hot weather than *X. astia*.

"Cragg has made similar observations on fleas from Bellary, in Madras.

"It would be useful to ascertain the monthly incidence of both species of flea on rats in the plague area. To obtain sufficient data, however, it would be necessary to devote the services of two attendants to a daily flea collection at the depot.

"I find that *X. cheopis* can only be bred successfully in the laboratory during the cooler months of December and January.

"It would appear, therefore, that the seasonal variations in plague incidence can be attributed to the effect of climatic conditions upon the activities and reproductive power of *X. cheopis*.

"The immunity of Madras from plague may be attributed partly to the fact that the population mainly subsists on locally-grown rice, so that little grain is imported from plague-infected districts, partly to the effect of the long hot weather on the breeding of *X. cheopis*. Plague would probably break out in Madras city if a sufficient number of *X. cheopis* were transported there during the cool weather.

"The observations of Cragg and the writer on the distribution of *X. cheopis* in Madras lead to the conclusion that the long immunity of Colombo from plague must be attributed to the existence of a broad *astia* zone in the hot dry lowlands of Madras, through which infected *X. cheopis* and its eggs, larvae and cocoons had to pass before they could reach Colombo amongst rice and grain exported from South Indian ports.

"The larvae of *X. cheopis* can only be expected to survive this passage during perhaps two months in every year.

"Infected adult fleas would die out within the first few days of being transported in trains carrying foodstuffs across such country."

**STRAITS SETTLEMENTS. The Municipality of George Town, Penang. Health Officer's Annual Report for the Year 1923.** [ROSE (J. Stuart), Municipal Health Officer.]—pp. 22+7. With 1 folding chart. 1924. Penang: C. A. Ribeiro & Co., Ltd., Printers. [Price 50 cents.]

#### Statistical Summary.

Situation Lat. 5° 24' N. Long. 100° 1' E.

Average elevation above L.W.M.O.S.T....	{	Town area 12 ft. 6 ins.
O.S. Tides rise and fall ... ..		Country area 25 ft. 0 in.
		9 ft. 0 ins.

Rainfall 1923 (average of three readings

within Municipal Limits) ... .. 127.14 inches

Mean Temperature 1923 ... .. 81.9° F.

Maximum Temperature ... .. 90.2° F.

Minimum Temperature ... .. 71.6° F.

Total area of Penang Island ... .. 108 sq. miles

Area within Municipal Limits ...	...	9.4 sq. miles or 5,803 acres.
Estimated population (mid-year) ...	...	128,300.
Density of population ...	...	{ 13,649 per sq. mile. 22.1 per acre.
Crude death rate ...	...	29.62 per mille.
Infant mortality ...	...	155 [figure falling very satisfactorily (1906-380). Two whole-time and 8 part-time nurses employed].
Birth rate ...	...	31.39 per mille.
Sterling equivalent of \$1 ...	...	2s. 4d. (approximately)

JOHORE. **Territorial Medical Report for the Year 1922.** [ORME (W. B.), Principal Medical Officer.]—27 pp. 1923. Johore Bahru : Govt. Printing Office.

This report is extremely interesting. Population 282,234, birth rate 36.22, highest amongst Malays, 48.36, lowest among Indians, 13.28. Death rate 29.22. Infant mortality 175.19 per 1,000.

Climatic conditions.—Rainfall varies considerably ; in the Southern half of the State it is in the neighbourhood of 80 in., in the north very much less. Temperature, highest maximum 98°, minimum 68°.

There are two kinds of hospitals, the Government and the Estate. The State of Johore provided 3,023 beds, which is one bed for 93 of the population.

"It is with great satisfaction that attention is drawn to the Section on 'Special Diseases,' viz., Black Water Fever, Malarial Fever, Ankylostomiasis, Beri-Beri and Bowel Complaints, under which headings remarkable results have been achieved. Pulmonary tuberculosis, however, increases in its ravages year by year and has become a menace which demands united action throughout Malaya ; the remedy is well known, but its rigid enforcement is expensive and would be strenuously opposed by vested interests as increasing the cost of living."

Blackwater fever cases totalled in 1922 7 cases with 3 deaths. During the past 5 years the number of cases have been 61, 59, 34, 33, and 7 respectively.

Malaria naturally produces a large number of cases ; it is, however, on the decrease. 1922 produced 3,821 deaths, *i.e.*, 358 less than in 1921, with 2.59 per cent. of deaths to total treated cases in the Estate Hospitals. Government hospitals have a much higher rate, 5.33, probably because people only have recourse to them when *in extremis*.

Most happy results can be claimed in the treatment of ankylostomiasis. The disease is rapidly decreasing in prevalence and in percentage of deaths.

On beri-beri the author makes the following remark :—"One is inclined to think that much of the improvement in the incidence of this disease brought about by the use of accessory foodstuffs, such as wheat-flour, during the days of food control, is being rapidly lost. The Chinese undoubtedly prefer their highly polished Siam rice in spite of its well-known deficiency in vitamins."

Phthisis.—441 deaths were registered from this malady, being an excess of 88 over previous years.

A large amount of work has been done in the laboratories, over 7,800 blood films being examined. Malaria parasites reported—Benign tertian 733, Quartan 497, Subtertian 1,088, mixed infection 117.

The country was entirely free from plague and cholera. Anti-malarial measures.—Some 20,000 dollars were expended and a good deal of permanent work was undertaken, particularly in draining of swamps, filling up of ditches, etc., in the neighbourhood of Johore.

**FIJI. Legislative Council. Medical Department. Council Paper, No. 21. Annual Medical Report for the Year ending 31st December, 1922.** [MONTAGUE (A.), Chief Medical Officer.]—34 pp. 1923. Suva: By Authority: S. Bach, Govt. Printer.

Population 162,045. Birth rate 31·86 per 1,000. Death rate 15·93 per 1,000.

"The health of the Colony generally was good, despite the economic depression and the resulting fall in wages. Typhoid fever was the only acute infectious fever that was more than usually active; dysentery was probably less prevalent than in any previous year in the Colony's history; yaws was vigorously attacked by means of the salvarsan compounds and, as the native mother is no longer eager for her child to have yaws, there is hope of the ultimate eradication of the disease. Complete elimination of ankylostomiasis from the population is a more difficult matter, but if the present efforts are continued it seems likely that clinical ankylostomiasis will almost disappear. Salvarsan, mercury, and the absence of non-immune immigrants have greatly reduced the incidence of syphilis."

**SARAWAK. Annual Report of the Sarawak Government Medical Department for the Year 1922.** [CLARK (W. E. Le Gros), Principal Medical Officer.]—17 pp. Kuching: Printed and Published at the Govt. Printing Office.

"The general health of the country has been undisturbed by any serious epidemic during the year. In October eight cases of small-pox were reported from Mukah by Dr. Majoribanks, who went to the affected district in order to take control of the situation. All the cases and contacts were isolated and the necessary vaccinations carried out. No further cases occurred.

"An epidemic of dengue fever began in Kuching during the month of July, affecting the bazaar communities and the majority of Europeans. At the end of the year a few sporadic cases only were noted.

"Influenza, which may be regarded as endemic, occurred throughout the year in a very mild form. Among the native communities, tuberculosis and yaws command attention by their prevalence. With regard to tuberculosis, it will be noted that over 30 per cent. of the deaths occurring during the year at the General Hospital, Kuching, were due to phthisis.

"The treatment of yaws by injection of novarsenobillon is increasing in its application, and it is anticipated that there will be considerable progress in this line during the year 1923"; 2,473 injections were given.

An alarming increase in the number of lepers is reported. A new leper settlement is, however, nearly ready.

An interesting note is given on the use of a mixture of carbon tetrachloride and oil of chenopodium as an anthelmintic.

"The results of the treatment have been tabulated below. It has been found that carbon tetrachloride alone is a fairly efficient anthelmintic for *Ascaris* as well as for hookworms, but in combination with oil of chenopodium it has a much higher efficiency and practically never fails. This combination is believed to be somewhat more effective than carbon tetrachloride alone for a pure hookworm infection also. Doses up to 1 drachm of carbon tetrachloride alone are being given to adults. Formerly m. 80 were frequently given, but cases that were resistant to 1 drachm were usually found to be equally resistant to the larger dose. The dose is given first thing in the morning before eating and no purge is given."

A large amount has been done in the pathological department, particularly on blood smears and examining faeces for helminths.

**NEW SOUTH WALES. Report of the Director-General of Public Health, New South Wales, for the Year 1922. Including a Report on an Outbreak of Plague at Sydney, September, 1921-July, 1922.** [ARMSTRONG (W. G.), Director-General of Public Health.]—pp. v+139. With 2 graphs & 1 map. 1923. Sydney: Alfred James Kent, Govt. Printer. [Price 6s. 9d.]

"Plague outbreak at Sydney, 1921-22 (Report, pp. 31-52).—

"The outstanding event of the year in connection with public health was the outbreak of plague, which, beginning in the latter weeks of 1921, continued throughout the first half of 1922. Sydney was the only locality in the State affected. During the outbreak thirty-five human beings were attacked, of whom ten died. Plague patients were treated at the Coast Hospital. The first human case occurred on 29th November, 1921, and the last on the 9th June, 1922. The number of plague rats found was 148. Two infected cats and a guinea-pig were also found. . . .

"The lessons derived from the outbreak recapitulated and emphasized those taught by the 1900-1909 outbreaks, namely, that the disease is not spread by human beings but by rats; that the best methods of prevention are those that aim at rendering premises incapable of occupation by the rat tribe; and that next to this it is most necessary to wage an exterminatory war against the rat population, particularly in neighbourhoods immediately adjoining those on which plague rats have been found. . . .

"*Fumigation by HCN Gas.*—For the first time probably in dealing with an extensive outbreak of plague a very wide use was made of hydrocyanic acid gas in the disinfestation of infected buildings. Seventy-seven different buildings were dealt with by this method with the most satisfactory results. The gas invariably destroyed all vermin in the buildings treated, and its application was found to be both convenient and rapid. By the enforcement of very thorough precautions the use of this method was not attended by any fatal accident to human beings. . . .

"*Hookworm infection.*—The State has been for twelve months acting in co-operation with the Commonwealth and the International

Health Board (Rockefeller Institute) in carrying out a campaign against this disabling and distressing, though not necessarily fatal, disease. It chiefly affects children of the school ages. A survey has been made of the whole susceptible area, and the amount of disease present has been ascertained. All known patients have been treated once, and further treatment is now being supplied. Special arrangements have been made for the routine intermittent treatment of aborigines, who are, owing to their habits, very susceptible to this disease, and form a reservoir from which it spreads to the white population. Every effort is also being made by the Aborigines Protection Board, working in collaboration with my Department, to provide decent sanitary accommodation at the several aborigines stations and to enforce their proper use by the coloured populations. . . .

"Notifiable infectious diseases (p. 18).—

"*Typhoid fever*.—The State experience as regards the prevalence of notifiable infectious diseases was very favourable in respect of all diseases. The typhoid fever experience was particularly satisfactory. The number of cases notified (706) is the lowest ever recorded in New South Wales. Broken Hill furnished almost the only exception to this generally satisfactory state of affairs, that city yielding 115 cases of typhoid fever, or about one-sixth of the total of the whole State. For many years the incidence at Broken Hill has been higher than almost anywhere else in the State, and this is considered to have been in part, at any rate, due to unsatisfactory methods of treatment of excretal matters in that town. On more than one occasion this Department has offered general free anti-typhoid inoculation to the inhabitants of the city of Broken Hill, but the offer has never been taken advantage of."

**QUEENSLAND. Annual Report of the Commissioner of Public Health to 30th June, 1923.** [MOORE (J. I.), Commissioner of Public Health.]—24 pp. 1923. Brisbane: By authority: Anthony James Cumming, Govt. Printer.

Population, 790,239. Birth rate, 25.53. Death rate, 9.14. Infant mortality, 50.5 per 1,000 births.

Ankylostomiasis, only 11 cases were notified.

Plague.—Four individuals of the gray rat (*norvegicus*) were found infected with plague, the first in July and the last three in October, 1922. Flea investigations were continued. What are known as sentinel guineapigs are used in several areas in S. Brisbane in order to attract the fleas in rat-infested buildings. From 23 rodents and 2 guineapigs 132 *X. cheopis* were obtained, 10 *C. canis*, 1 *C. fasciatus*, 3 *P. irritans*.

Much good rat-proofing work has been accomplished, with the result that rubble walls under wharves, which in the past afforded a natural and secure habitat for rats, now no longer exist; these prevented trapping or the laying of poisoned baits. At the present rate of progress the completion of the whole area should only be a matter of time, and then safety will be ensured against a reinvasion of plague carriers.

Enteric fever is still very prevalent. 200 cases were notified in the Metropolitan area and 258 from the districts. The writer considers that most of these were fly-borne.

BRITISH GUIANA. **Report of the Surgeon-General for the Year 1922.**  
[KELLY (P. James), Surgeon-General.]—90 pp. 1924. Georgetown, Demarara : "The Argosy" Company, Ltd., Printers to the Govt. of British Guiana.

The following extract is taken from the report of the laboratory work for the year.

"*Ankylostomiasis*.—It is worthy of note that the proportion of stools showing ankylostome ova and the proportion of post mortems yielding adult worms show a material increase in recent years since the departure of the Rockefeller Commission.

"Nearly every specimen of faeces sent to the Laboratory is examined for ova as a routine measure. In 1922, out of 698 stools from separate individuals thus examined, no less than 305 or 43·7 per cent. showed the presence of ankylostome ova. Further testimony to the prevalence of this infection is obtained from experience in the post mortem room during the past year.

"Moreover, an appreciable number of the cases which harboured these parasites were domiciled in Georgetown, a disquieting circumstance when it is remembered that these ova are not eliminated by passage through the septic tanks which have been installed about the city."

MINETT (E. P.). **A Brief Review of the Public Health Statistics of the Colony.**—*British Guiana Med. Annual for 1923.* pp. 137–147.

"The total population of the Colony [British Guiana] shows an increase of 16,607 up to the year 1915, but a falling off of 5,101 from 1915 to 1920, so that the total increase for the nine years from 1911 to 1920 is reduced to 11,506. The report of the census taken in 1921 is not published, but it is understood that the actual population of the Colony as shown by the census is considerably below the estimated population. . . .

"The birth-rate for the year 1920, given as 31·9 per 1,000 of the estimated population, shows an increase of 3·1 during the nine years from 1911, but of this only an increase of ·6 has been added since 1915. The highest birth-rate recorded during the period under review is that of 34·6 in 1913. . . .

"The figures for 1920 show a decrease of 6·1 over the death-rate for 1911, but a decrease of only 2·1 over that of 1915. . . .

"The infant mortality tables show a very gratifying decrease of 81 deaths under one year per 1,000 births as regards 1911 and a decrease of 36 per 1,000 over the year 1915. . . .

"The figures show a slight decrease of 1 per 1,000 for the whole colony, ·7 per 1,000 for the City of Georgetown, and 1·7 for New Amsterdam as regards diarrhoea, dysentery, etc., but this decrease is negatived by an increase in the death-rate for enteric fever. For this disease there is an increase for 1920 over the 1911 figures of 0·1 for the whole colony, 0·2 for the town of New Amsterdam, and 0·5 for Georgetown."

There is a decrease in the pneumonia, diseases of the chest and tuberculosis, whereas filariasis is on the increase in the crowded wards of the city.

WISHART (W. de W.). **Some Aspects of the Sanitary and Public Health Problems of Georgetown.**—*British Guiana Med. Annual for 1923.* pp. 43–52.

The author gives a very clear account of the sanitary situation in Georgetown. He points out that the major works of sanitation are three in number, and concern drainage, water supply and a sewerage system. They are arranged in what he considers to be the order of their importance.

As regards drainage the author points out that the town is situated  $4\frac{1}{2}$  feet below high water level; consequently the only time in which drainage is possible is in the inter-tidal period. Considering that this only allows of 4 ins. of rainfall in 24 hours, it stands to reason that the town may be water-logged, but opening of the sluices generally removes the water fairly rapidly.

The water supply is generally derived from the rainfall and a subsidiary supply from an impounded river, which is quite unsuitable for a drinking supply; at certain times of the year this water is actually superior bacteriologically to the drinking supply. There can be no doubt that a properly protected and adequate supply is one of the necessities of the town.

Considering the difficulties of drainage the sewage water removal system is not a cheap proposition, but is one which must come if the sanitation of the city is to be improved. It is pointed out by an engineer authority who visited the town that it is eminently suitable for the compressed air Shone's ejector type of drainage and there appears to be no serious difficulty in the way beyond expense.

Turning to the minor points, anti-mosquito measures are undoubtedly necessary, screening of the water-vats has been carried out more or less carefully, oiling of cesspits has brought about very considerable improvement in the decline of the number of culicines in the town; the removal of rubbish has also been considerably improved. Recently the Health Officer's suggestion for small light household dustbins in place of the larger ones stationed in the streets has been adopted.

A new abattoir is required and regulations concerning the milk supply. At the end of the report there is an extremely interesting note appended by the editor, that the recommendations made in the above report have been adopted and a loan floated in order to carry them into effect.

TRINIDAD & TOBAGO. Council Paper No. 70 of 1923. **Health Conditions, 1922. Administration Report of the Medical Inspector of Health for the Year 1922.** [DICKSON (J. R.), Medical Inspector of Health.]—12 pp. 1923. Port of Spain: Govt. Printing Office, 2, Victoria Avenue. [Price 6d.]

#### Summary of vital statistics.

Population estimated to mid-year ... ..	371,105
Area of Trinidad (1,862 sq. miles), Tobago (114.40 sq. miles) ... ..	1,976.40 sq. miles
Density of population ... ..	187 per sq. mile
Total number of births registered ... ..	11,925
Birth-rate per 1,000 of population ... ..	32.1
Total number of deaths registered ... ..	8,451
Death-rate per 1,000 of population ... ..	22.7

Natural increase, <i>i.e.</i> , excess of births over deaths	3,474
Total number of still births registered ... ..	1,006
Number of deaths of children under 1 year ... ..	1,665
Infantile mortality rate (per 1,000 births) ... ..	138
Notifiable Infectious Diseases—Total death-rate per 1,000 population ... ..	3.16
Malaria, death-rate per 1,000 of population ... ..	2.25
Enteric fever, death-rate per 1,000 of population ... ..	0.53
Dysentery, death-rate per 1,000 of population ... ..	0.56
Diarrhoea and enteritis, death-rate per 1,000 of population ... ..	1.77
Pulmonary tuberculosis, death-rate per 1,000 of population ... ..	1.13
Bronchitis and Broncho Pneumonia, death-rate per 1,000 of population ... ..	1.47
Pneumonia, death-rate per 1,000 of population ... ..	1.22
Nephritis and Bright's Disease, death-rate per 1,000 population ... ..	1.40
Cardiac Diseases, death-rate per 1,000 of population ... ..	0.92
Ankylostomiasis ... ..	0.77

GRENADA. **Report and General Abstract of the Registrar General of Births, Deaths, and Marriages for the Year 1923.** [FERGUSON (Herbert), Registrar-General.]—16 pp. 1924. St. George : Govt. Printing Office.

Estimated population at 31st December, 1923, 68,086.

Birth-rate was 38.58 as against 29.50 for 1922.

"The death-rate per 1,000 was 16.6, as compared with 18.8 in 1922. The death-rate of 16.6 per 1,000 is the lowest so far recorded in the annals of the Colony. The low death-rate has coincided with a year of deficient rainfall," although "an examination of death-rate in relation to volume of rainfall over the past twenty years does not reveal any striking relativity between the two. . . . It is equable distribution of rainfall throughout the year that has contributed in a great degree to the low mortality. . . .

"The death rate, per 1,000 births, of infants dying under one year was 86.79. In 1922 the rate was 114.01. . . .

"The most conspicuous feature in the causes of death is the reduction in the number of deaths from dysentery, which decreased from 83 to 33, and from diarrhoea and enteritis, which declined from 329 to 283. A contributing factor to this result is, as previously mentioned, equable distribution of rainfall throughout the year and the absence of a period of severe drought followed by heavy rainfall."

BONNE (C.). **L'organisation du Service de Santé et l'état sanitaire dans les colonies hollandaises d'Amérique.**—*Presse Méd.* 1924. Feb. 27. Vol. 32. No. 17. (Supplément.) pp. 337-338. With 1 fig.

The writer gives an account of the health establishments of Dutch Guiana and the neighbouring Dutch Islands. Dutch Guiana contains approximately 100,000 inhabitants of mixed origin, negroes, half-castes, Indians, Chinese, etc. The population of the chief town, Paramaribo, is 40,000. The total white population is about 1,000. The death rate in 1920 was 21.2, in 1921 23.8. The birth rate in 1920 was 32.9, in 1921 33. For the islands the birth rate for 1920 was 26.9, for 1921 25.8; the death rate for 1920 was 22.4, for 1921 20.3.



Malaria is more or less prevalent throughout the Colony. It is not a serious matter in the capital nor on many of the estates, but in the interior there are malarious plateaus. Filariasis is a disease of the town; it is unknown in the interior [the same applies very largely to Georgetown in British Guiana]. Ankylostomiasis, leprosy, typhoid, bilharziasis, leishmaniasis, fever allied to dengue, the two dysenteries and pellagra are prevalent. On the other hand there is no cholera, plague, yellow fever, smallpox, schizotrypanosomiasis or relapsing fever known in the country.

The medical service consists of European and native doctors trained at Paramaribo. The general hospital has 700 beds. A special training in tropical diseases is available for the European at Amsterdam and Leyden.

In the Islands there is the usual Government doctor and subordinates for each island.

Curaçao has a population of 30,000 inhabitants with a good hospital. There is not much sickness. Malaria is unknown in the Islands, the rainfall being small.

SOUZA (G. H. de Paula). **Serviço de Estatística Sanitária.**—*Sciencia Medica*. Rio de Janeiro. 1924. Jan. 31. Vol. 2. No. 1. pp. 16-40. With 1 fig.

The aim of the Sanitary Department to keep statistical returns reliable is far from easy of attainment. Census records are rendered inaccurate owing to a large migratory population. Registration of deaths is more perfectly carried out, only 5 per cent., or thereabouts, being unregistered. The Civil Registrar forwards his records weekly, together with the original certificates, to the Health Department, so that the accuracy of the records is checked. Nearly 40 per cent., however, of the deaths take place unattended by medical men, and large numbers are, therefore, uncertified as to the actual cause of death.

15-40 per cent. of the deaths registered in the capital are ascribed to infectious diseases. One of the greatest complaints voiced by the author is of the delay in publishing records, which in some instances do not appear until so long after the event that they are practically useless.\*

SOUZA (G. H. de Paula). **O Estado de São Paulo e alguns dos seus serviços de Saude Publica.** [Public Health in São Paulo.]—*Ann. Paulist. Med. e Cirurg.* 1923. Dec. Year 11. Vol. 14. No. 12. pp. 169-190. With 3 folding plans & 1 map.

An account of public health movements since their inception in 1892 is briefly given, which shows that of recent years development has been rapid. The subject is dealt with under various heads, such as general prophylaxis, the establishment of permanent municipal sanitary stations, hookworm campaigns, suggested modifications of the present system, and financial considerations. The section of general prophylaxis treats of endemic conditions such as malaria, leprosy, syphilis, trachoma, and helminthiasis. This service was started in 1918 with four stations, but now comprises 26 in full working order. A detailed schedule of the work of a permanent municipal health station is given and includes sanitary education, treatment (both curative and preventive) of endemic diseases, especially malaria, trachoma, venereal

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\* Summarized by Dr. H. Harold Scott.

affections and hookworm, in which the Rockefeller Foundation has aided, the inspection of school-children, provision of a laboratory and the keeping of a stock of vaccines and sera. Modifications are suggested with a view to improving certain public health undertakings, particularly those relating to maternity and child-welfare, industrial hygiene, food protection and housing. These, though excellent in theory, appear to tend to over-elaboration, the Health Directorate being in immediate control of at least 13 different sections each with numerous divisions and subdivisions. The final section of the paper is concerned with financial questions of local interest and application.\*

SOUZA (G. H. de Paula) & MORENA (Nicolino). **Sugestões para a melhoria da legislação sanitária estadual, sobre generos alimentícios.** [Suggestions for Improving the State Sanitary Legislation Relative to the Food-Supply.]—Instituto de Hygiene. São Paulo. 1924. Bol. No. 20. 42 pp.

In their introductory remarks the authors state that the present situation as regards food-protection is deplorable, in the almost complete absence of laws and regulations as to purity. There are several small laboratories, independent of each other, inadequately staffed, poorly endowed, and under no central control. Suggestions are made for remedying this state of affairs by instituting properly trained and authorized inspectors of food; by issuing regulations relative to food preservation, food adulteration, the use of colouring matters; by determining standards of purity for food and drugs, and so on.

Details are given of such regulations applicable to each article—meat, milk and milk products, cereals, condiments, wines, water used in the preparation of mineral waters, etc.; these are on the usual lines.\*

BARRETO (João de Barros). **Serviços de Saneamento e Prophylaxia no Paraná. Antigos Problemas novos Horizontes.**—108 pp. With 14 plates & 18 text figs. Annexos 21 pp. and 9 pp. 1924. Curitiba: Placido e Silva & Comp., Ltda.

This record of the Health Department of Parana is divided into 7 sections. The first is introductory and historical; the second deals with the sanitation of dwellings, disposal of refuse and excreta, and the question of water supply. In some districts there is a piped supply, but in others, e.g., Morretes, the river water is used for drinking, although the river is used also as a sewer and into it is discharged the refuse from a paper factory.

The third section gives an account of the prophylaxis of transmissible diseases. The plan laid down is extensive and aims at dealing with ankylostomiasis, malaria, leprosy, smallpox, venereal diseases, trachoma, the dysenteries, the enteric group and cerebro-spinal fever. For treatment of the first-named carbon tetrachloride has largely superseded oil of chenopodium and is highly spoken of. As regards leprosy 357 cases are recorded amongst a total population of 462,517, or 7.7 per 10,000. In the district of Pirahy the incidence is highest, 6.44 per mille. The usefulness of disinfection for prevention of venereal diseases is well shown by the Dispensary records. Of 832 soldiers who made use of this measure only 3 (0.36 per cent.) contracted disease,

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\* Summarized by Dr. H. Harold Scott.

whereas of 150 who refused it 27 (8 per cent) suffered. In section IV the question of food protection and purity and the establishment of standards, particularly as regards the milk supply, is considered. Next follows a short chapter on Child Welfare, on the usual lines, of instruction of parents, the provision of health visitors, care in infant feeding, and so forth. Section VI, on laboratories, is very meagre, the work done consisting at present of routine examinations, chiefly Wassermann reactions. Doubtless, if the above-mentioned schemes are undertaken, this branch of the Department will be in much greater demand. The final section consists of statistics and gives also a brief account of educational propaganda work. Verbatim copies of articles on venereal diseases, their nature and prevention, printed in the local lay press are given in the appendix.\*

### REVIEWS AND NOTICES.

LEAGUE OF NATIONS. **The Health Organization of the League of Nations.**—39 pp. With 1 map. 1923. Geneva: Information Section, League of Nations Secretariat. [Price 3d.—5 cents.]

The Health Organization of the League of Nations consists of (1) an Advisory Council, which, meeting twice a year, deals with matters submitted by the Health Committee and also may initiate questions for consideration by that committee; (2) a Health Committee, which advises the Council and Assembly and directs the work of the League on all Health questions, reporting annually to the Advisory Council; and (3) an executive Secretariat, which is the Health Section of the general Secretariat of the League.

The work of the Health Department is here considered under four main headings: (1) intelligence; (2) co-ordination of the results of scientific research; (3) international co-operation in great epidemics, and (4) collaboration with other technical departments of the League.

*Intelligence.*—The work of this section includes (a) the general study of epidemiology—the incidence, distribution, and periodicity of particular epidemic diseases, and the collection, collation, publication, and distribution of such information; towards this work the Rockefeller Foundation is giving for five years an annual contribution of 32,840 dollars; (b) collection and study of information for standardizing vital statistics and promoting uniformity of administrative records and arranging educational conferences of vital statisticians with the same object; for the latter purpose the Rockefeller Foundation in 1923–4 contributed 31,500 dollars; (c) promoting educational intercourse between nations by fellowships and interchanges of public health personnel, to which object the Rockefeller Foundation contributes 60,080 dollars a year for three years. How these instructive interchanges work is thus exemplified:—30 medical officers selected from the health administrations of 17 different countries meet together in London under the wings of the Society of M.O.H. After a week of lecturing they go to the provinces in fours, for four weeks, to study the doings of various local health authorities. Then they reassemble in London for a fortnight to compare and discuss their experiences and to study the sanitation of the Port. Then they go off to Austria for five weeks' observations of the sanitary institutions of that country. Finally they go to Geneva to study the League's health machinery. Or, to give an example of another kind, representatives of 11 countries interested in malaria meet together in Italy for three weeks, to study malaria control under the Italian Health Service.

*Co-ordination of Scientific Researches.*—The Health Organization does not finance pure research; it confines itself to facilitating the practical

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\* Summarized by Dr. H. Harold Scott.

application of discoveries already well established—to such matters as the standardization of sera and serological tests and “biological products” of therapeutic value.

*International concert in epidemic disease.*—One object is to prevent the general spread of epidemics by strengthening the efforts and supplementing the means of the public health authorities of the different countries menaced. This object is exemplified in the work of the Epidemic Commission in Eastern Europe, established in 1920 and still in action. Assistance has been rendered, in Poland and in Greece, in the feeding, clothing, cleaning, and transport of refugees; in disinfection, vaccination, and other quarantine work; and in equipment and supplies of hospitals. Another object, exemplified by the Warsaw Health Conference, is the formulation of principles of sanitary defence in a comprehensive scheme of international conventions to be worked not through diplomatic channels but by national health administrations direct, with the health department of the League as mediator, if necessary. The conventions deal with notifications, exchange of information and publications, definition of limits of infection, full details of measures of prevention and prophylaxis taken and proposed and of frontier inspection and quarantine, etc. An example of still another kind is the commission of experts from Belgium, France and Great Britain, appointed by the Health Committee to investigate the incidence of sleeping-sickness and tuberculosis in equatorial Africa. Other instances of the League's activity in the directions exemplified are the Eastern Mediterranean Inquiry into international action for the prevention of epidemics in the Near East; the Inquiry in Far-Eastern Ports, in anticipation of international concert for the sanitation of that part of the world; the Cancer Inquiry; and an inquiry into malaria prevention.

A. Alcock.

BALFOUR (Andrew) [C.B., C.M.G., Director, London School of Hygiene and Tropical Medicine] & SCOTT (Henry Harold) [M.D., M.R.C.P. Eng., London School of Hygiene and Tropical Medicine]. **Health Problems of the Empire—Past, Present & Future.** [No. 5. The British Empire Series.—Edited by Hugh GUNN.]—pp. xxi + 413. With 9 illustrations. 1924. London: W. Collins & Co., Ltd., 48, Pall Mall. [Price 16s. net.]

This book is not a scientific treatise, though it deals with a branch of science and is conceived and constructed in a scientific spirit; it is not a book of reference, though it is based largely on historic records: it is a romance—a romance of humanity sore let and hindered, and often tragically deluded and self-obstructed, in the struggle against disease, but at length winning through, here and there, not indeed to victory but to the means of victory—a romance of irresistible British progress through much apathy and stupidity, from insanitary chaos towards settled sanitary order.

Very properly does the story start with DRAKE and HAWKINS and the rude ship-hygiene of those famous sea-captains through whose venturous constancy this sceptred isle became the keeper of the keys of a British Empire: with appropriate felicity does the prologue intimate how the valuable negro merchandise that good John HAWKINS carried from the Guinea-coast carried also, in the womb of time, some troublesome seeds of sanitary problems for the confines of the British Empire of this present and particular survey.

From this suggestive background of the Tudor navy and the slave-trade we are taken all round the Dominions of to-day, and are told at each stopping-place something of how from dubious beginnings it struggled in the direction of salubrity.

Starting with what the authors call the “Homeland,” we get a salutary reminder that the infinite dirt in which our forefathers wallowed was not officially repudiated by Act of Parliament until 1848. Thereafter, under the chastening influence of cholera, the popular “ignorance, which finds

not till it feels," became properly submissive to sanitary authority, and now under a Ministry of Health we may indulge a trembling hope than an instructed and enfranchised proletariat may endorse the dictum of Disraeli that the first consideration of a government should be the health of the people. In the summary of the "Homeland" the authors also trace the influence—long retarded, but suddenly accelerated by the malaria discoveries of LAFERAN and of ROSS—of MANSON'S epochal discovery upon medical education and upon the investigation of the aetiology of disease at home.

From the mother-country we pass to the ocean highways and the hygiene of the Navy. Quotations from *Roderick Random* remind us of the horrors encountered by a surgeon in a ship of the line 200 years ago, and the quoted admissions to Haslar Hospital for the years 1758-60—fevers, 2,174; scurvy, 1,146; smallpox, 53; leprosy, 30—serve to illustrate the results. We are told about LIND (1716-94), who discovered for himself (as, indeed, HAWKINS had discovered for himself 150 years before) how to distil fresh water from the sea and knew how water could be purified by means of quicklime, who formulated rules for the prevention of typhus which stand good at this day, who advocated lemon-juice and understood its pre-eminence over lime-juice, and counselled the growing of watercress on blankets, and in many other ways revealed himself as a "great naval hygienist." The works of many good men after LIND are recited, until we come to William BURNETT (1779-1861), who made arrangements for professional instruction of naval surgeons, although the school at Haslar was not established until twenty years after his death. One regrets in this survey of the British Empire to miss here one of the greatest names in its annals—NELSON, who, from his early days in the West Indies to his last long cruise after Villeneuve, was, by his own personal solicitude, singularly successful in maintaining the health of a ship's company.

After the Navy comes the Army and the story of the quickening effect of war upon the sanitary applications of science. From pioneers like MONRO, whose work on army sanitation (1780) has "a wonderfully modern air," and PRINGLE, whose *Observations on the Diseases of the Army* was eulogized by SIMON as "one of the classics of Medicine," we pass a gallery of worthies until we come to the HERBERT Commission after the horrors of the Crimea, to PARKES and his famous *Manual*, to the Army Medical School, and to the distinguished men of the present day and the perfected sanitary organization of the most awful war in history.

Next we go to the West Indies, where we hear a tale that is reiterated elsewhere all round the tropics—a tale of islands wonderfully favoured by Nature but pronounced accursed by white men who had not yet learned how to live there, men who ate "like cormorants" and drank "like porpoises," and perhaps paid too much court to the *nymphae solutis zonis*; men who founded their settlements too near swamps, or among native crowds whose only scavengers were "the vulture, the pig, and the pariah dog"—a tale of appalling death-rates and the white man's grave. Then, if commercial prosperity became assured, hope returned and there came some official recognition of sanitation, and, if prosperity still increased, some degree of sanitary organization. On the other hand, if, as in the West Indies, prosperity declined, public attention would cease to be attracted to sanitary questions, or if attracted would recoil from the expense.

From the West Indies we go to Canada, where the public health became the object of definite enactment in 1832 and municipal and rural sanitation are now, to say the least, as well advanced as in England. It was a Canadian who taught his fellow countrymen, as long ago as 1876, that "public hygiene is the most important matter any community can discuss, for upon it, in its perfection, depend all the powers, moral, intellectual, and physical, of the State."

British West Africa comes next. Here the story begins, very much as in the West Indies, with the tune of the white man's grave; but changes so completely subsequent to the establishment of the West African Medical

Service that the authors now conjecture the West African possessions to be, to sanitary sight, "the brightest jewels in the diadem of Crown Colonies." Though sanitary organization has reached the standard of Research Institutes, the authors give very free expression to their opinion that these brightest jewels are behind French West Africa in the matter of original research. The French "appear to set more value on such work than we do, or, at least, they subsidize it to better effect"; and the authors attribute this difference to the fostering influence of the Pasteur Institute of Paris.

In dealing next with the Union of South Africa the Imperial chord is struck, the Cape being not merely the gate-house of South Africa but the halfway-house to the East. The early records here, as might be expected of a people then mainly pastoral, contain little information about public health, which up to 1883, when the first Public Health Act was passed, was in the hands of the local medical practitioners. At the present time sanitary affairs in South Africa exhibit some inequalities. On the one hand is the elaborate organization of the mines, and the bacteriological work of Spencer LISTER which is of almost world-wide importance; on the other hand "a considerable section of the population—not only native and coloured, but European—lives under conditions of overcrowding and insanitary housing; many of the smaller towns and villages still have dirty and polluted water-supplies; in many centres tuberculosis is a serious scourge; malaria is prevalent and is retarding the development of some of the most fertile parts of the country"; and "the native in the towns is a very grave public health problem."

Little is said of Rhodesia, Nyasaland, and Tanganyika Territory. In Southern Rhodesia malaria and blackwater fever are obstacles to progress; in Northern Rhodesia and Nyasaland sleeping-sickness stands in the background if it be not a vivid menace; Tanganyika, notwithstanding the sanitation of the Germans, is full of malaria and dysentery and has its sleeping-sickness and leprosy anxieties.

Zanzibar is of peculiar sanitary importance as the place where, being also the quarantine station of the territories of Kenya, Uganda, and Tanganyika, three native races, African, Arab, and Indian, mingle. Its early sanitary atmosphere, up to 1876 at least, seems to have been peculiarly noisome, but its sanitary problems have now been brought under control, and its streets, though not altogether fragrant, are conspicuously clean.

Of Kenya Colony the early sanitary history is in some ways like that of West Africa—settlements in the midst of a native population liable to malaria, enteric, dysentery, and periodic mortal epidemics. Its chief town, Nairobi, is an example of how a town should not be built; "like a canker the Indian bazaar, foul, overcrowded, ugly, and menacing" still stands in its midst. In this colony two dramas of Imperial interest are now staged. One lies with great creating Nature, and is concerned with the permanent colonization of the equatorial highlands by men of white race; the other lies in the seamy side of human nature, and affects the status of the uneducated and insanitary Indian immigrant.

Uganda is said to be, in comparison with some parts of Kenya, as a garden to a moor, though in many respects—and apart from the awful tragedy of sleeping-sickness—its sanitary history is similar, and its hygienic problems are similarly complicated by insanitary Indians. It is now devastated by syphilis, though large remedial measures are in progress. Its infantile mortality-rates reach the appalling figures of 600 to 900 per 1,000, and have an ominous imperial interest.

The Anglo-Egyptian Soudan has been fortunate in a sanitary administration chiefly by medical officers of the army, in the presence of the Wellcome Research Laboratory in the new Khartoum, and in the fact that for many years in succession it was ruled by a Governor-General who understood the importance of hygiene. It is now a good example of a vast territory rescued from devastating epidemics; but, as a Mahomedan

country with its annual pilgrimage to Mecca, its sanitary defences must always be kept efficient.

Mauritius is a text from which the authors expound many good lessons. A beautiful island set in the silver sea, a demi-paradise built by Nature for herself against infection, has, as the result of *laissez-faire* in matters of Asiatic immigration, become leased out to malaria, ankylostomiasis, plague, and dirt. These lessees have cost the island its health, its reputation, "thousands of lives and millions of money"; to buy them out—which can be done if its people are really in earnest—will cost some millions more.

The authors give but 16 pages to India, but from these scant pages may be taken three quotations that give birth to volumes of thoughts—some of them unutterable. 1. "The main mass of the revenue is derived from the soil, but the vast majority of the villages receive nothing in the way of sanitary attention." 2. "The Inchcape Commission recommended the abolition of the Public Health Commissioner, a recommendation accepted by the Indian Government but fortunately not by the Secretary of State." 3. "The greatest recent development in India has been the foundation of the Calcutta School of Tropical Medicine." To these quotations may pertinently be added this fourth, taken not from the pages on India but from those on Kenya: "Nothing appeals to a native more than efficient medical attendance. . . . It is one of the very few . . . advantages of civilization . . . for which he has any use. A skilled and sympathetic doctor is more of a civilizing and pacifying force than a company of infantry." These are great solid truths, they should be first principles, wherever the European rules over races whom because of their simpler social garniture we are accustomed to speak of as "uncivilized."

From the 6 pages devoted to Ceylon we learn that although an official sanitary officer has now been nominated to each of the urban district councils there does not exist outside Colombo and some districts in the Western Province any sanitary organization worth the name. "The cry is all for local government, and this in a place like Ceylon is apt to sound the knell of sanitary progress."

Singapore, though it became British in 1819, did not institute a municipal health department until 1887, notwithstanding its overcrowding and its permeation by insanitary horrors derived from China. There was no systematic destruction of refuse until 1887. Proper sewerage is a recent accomplishment. A campaign against malaria was begun in 1911. Malaria, pulmonary tuberculosis, dysentery, and beriberi have been the chief causes of death. But in recent years the necessities of sanitation have been liberally provided, and Singapore has at last "gained a measure of health."

The Federated Malay States afford a brilliant contrast to the usual tale. They had wealth to begin with, but they also started with a good medical service and they understood its value. Thanks to Malcolm Watson and the public opinion that supported him, malaria was banished from Klang and from Port Swettenham and from hundreds of square miles elsewhere. As early as 1900 Kuala Lumpur established an Institute of Medical Research which, quite apart from its own original investigations, has acted as a haven to the whole medical profession in the States.

The sanitary history of Hongkong—the largest port (by tonnage returns) in the world—is like that of Singapore. At first overcrowding with native labour, a foetid crowd living, 126 to the acre, without drains or a proper water supply; then *laissez-faire* and blank despair; in 1843, for example, 7,893 admissions to hospital and 440 deaths in a garrison of 1,526, to say nothing of mortality among the Chinese; then a desperate penultimate clutch at hygiene, with a realization of the fact that hygiene costs money. Fortunately, as at Singapore, money was forthcoming, and although Hongkong remained unhealthy for many years after a Sanitary Board had been constituted, its sanitary organization, which includes a magnificent Bacteriological Institute, and its public health are now on a par with its commercial prosperity. But an ever-present sanitary problem for Hongkong

is housing and all that that entails, and another perpetual anxiety since the great epidemic of 1894 is plague.

We come next to Australia. In the early days settlers were few and had plenty of room. But the increasing colonists began to herd together in towns, and the towns became cities, and notwithstanding the fine climate the cities became unhealthy. In Perth, in 1882, there were no settled arrangements for sewage. In Victoria, up to 1888-89, according to SPRINGTHORPE, town-cleaning had not ever been attempted, subsoil drainage was a thing unknown, and in Melbourne the beautiful river Yarra had become an open sewer, the side-streets smelt at night like ill-kept cesspools, and the water supply was "variable." Things were just as bad in New South Wales. In 1885 the death-rates from typhoid per 100,000 of population ranged from 32.84 in Western Australia to 169.90 in Queensland. But from the end of the eighties, when at last public attention had been aroused, sanitary progress has been continuous on much the same lines as in Great Britain. As a result the death-rate for the whole Commonwealth had fallen in 1920 to 10.62. In tropical Australia, as in Kenya, a great experiment in the acclimatization of a white race is in progress.

The early history of sanitation in New Zealand is almost a repetition of that of Australia. Regulations for the public health were enacted in 1872, but as late as 1889 the administration of the Act was found to be delusive, and it was not until 1900 that public opinion, awakened by fear of plague, fully realized that the physical welfare of the people is entitled to the first place in the consideration of government. But even under a Cabinet Minister and an able executive there was much obstruction from small local authorities, whose powers, however, were defined and regulated in 1920 under a Director-General of Sanitation. New Zealand has now the lowest infantile mortality-rate in the world; in 1919 it was 45.3 per 1,000 births, as compared with 89 in England and Wales.

The journey ends in the Melanesian Pacific, where the tale is a sad one of introduced diseases, and the health problems are of our own unhappy invention. Even our good intentions have often served the unfortunate islanders ill by interdicting customs which were the very salt of their life, and so depriving them of that indispensable minimum of soul which keeps mind and body from stagnation and from the pale malady of thought.

The rest of the book is devoted to empire diseases, empire burdens, and some other interesting generalities.

Empire diseases are defined as those of a communicable kind that have an obviously harmful effect upon the resources of the Empire, and are specified as ancylostomiasis, cholera, dysentery, enteric, influenza, malaria, plague, smallpox, tuberculosis, and venereal. A clear account is given of each, with particular attention to aetiology, control, and prevention.

The imperial burdens discussed are those laid from the beginning of things upon Eve, alcoholism, and narcotic drugs. As to the first, the authors discuss the causes of infantile mortality and give a sketch of what is being done in various places to assist the expectant mother and preserve her offspring; and along with this there are some qualifying remarks upon the possibility of doing too much for the relief of parental responsibility, and so, in over-anxiety for the welfare of the children, to damage the fathers' teeth. Alcohol, opium, and the other notorious narcotics are discussed without prejudice or overstatement, and in this connexion the authors emit some sensible reflections upon the popular book and film education-cure that is based on the inveterate fallacy that conduct is rectified by mere knowledge, and some equally sensible admonitions upon the present-day education that departs so widely from the wholesome stoical discipline of our forefathers.

The penultimate chapter shifts into the financial aspect of public health, and explains the value of sanitation "from the sordid aspect of finance alone." In days past fear was our teacher and we learnt our sanitation in tears, with many strokes—for example, 54,000 deaths in the cholera epidemic



of 1848. Now, in the comfortable school of finance, we are taught the money value (£5) of a healthy male infant and how that value mounts up to £500 as that infant, continuing healthy, grows up; and the money cost (402 million pounds sterling) of the mortality and disablement caused by plague rats in twenty years in India. Such calculations are very hard to appraise, but we can appreciate the economic lesson taken from the Panama canal under De LESSEPS and the Panama canal under GORGAS.

In the last chapter of all the authors penetrate the veil and reveal visions wherein, among other things, we discern a Ministry of Health grown very great, and an army of whole-time auxiliaries; a big museum of hygiene where the citizen would learn not only exactly how his complex sanitary wants are met and how he ought to live, but also how the benefits of sanitation can be imparted to the inhabitants of his tropical dependencies; institutes of original research protected from fanatics and busybodies; children learning the history of public health in school; disease being watched like the weather, and, unlike the weather, its epidemic outbursts being stilled at birth by ordered international machinery.

The authors, both of whom are known to be full of most excellent differences of ability, are to be congratulated on having written a most useful book, unlike other books on hygiene in being extremely interesting. It may have been intended for the well-educated layman, yet it is full of inspiration for the profession, and (seeing how plentifully lacking our medical schools are in arrangements for teaching the history of medicine and hygiene) it should be brought to the notice of every young medical man who intends to practise in the dominions overseas.

A. Alcock.

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#### CORRESPONDENCE.

SOCIETY FOR PROMOTING CHRISTIAN KNOWLEDGE. **Tropical Hygiene for African Schools.**—1922. London: S.P.C.K. House, Northumberland Avenue. New York & Toronto: The Macmillan Co.

With reference to the review which appeared in Sanitation Supplement No. 1 (Mar., 1924), p. 64, Canon F. ROWLING writes as follows:—

Conference of Missionary Societies in Great Britain and Ireland.  
Sub-Committee on African Christian Literature.  
London, E.C. 4, 24th April, 1924.

DEAR SIR,—In fairness to the Conference and the publishers, may we ask you kindly to make known the facts concerning the above booklet?

It was prepared by a schoolmaster of wide experience in Congo schools, revised and translated into French by Dr. Henri Anet, Brussels, and approved by Government. It has been translated into Kele, Luba, Nkundu, Heso, Kongo, and Kingwana (Swahili) in Congo languages; into Lamba for N.W. Rhodesia; Mauritius; and Malagasy for Madagascar; Swahili for E. Africa, and Ganda for Uganda. All except two in diglot.

In every case it had to be approved by committees or Boards on which keen criticism from men of long and intimate knowledge of African school work is met with. The medical department of the Uganda Government granted £50 towards the version, after approval by the P.M.O. and mission education committee, and Drs. A. R. Cook and J. H. Cook.

Any book which can pass through such an ordeal proves itself as near "gold" as a good currency can well be, even though a little alloy may be in it!

If your reviewer—or anyone else—can produce anything equal or better, within the limits of size and price conditioned by African school needs, we can ensure the warmest welcome to it. No one without intimate knowledge of African village life and work can do this with success.

Faithfully yours,

F. ROWLING, Secretary  
(ex-Sec. C.M.S. Uganda Mission).

TROPICAL DISEASES BUREAU

# SANITATION SUPPLEMENTS

OF THE

## TROPICAL DISEASES BULLETIN.

### APPLIED HYGIENE IN THE TROPICS.

BY LT.-COLONEL W. WESLEY CLEMESHA, C.I.E., I.M.S. (retd.).

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SUPPLEMENT No. 3.]

1924.

[OCTOBER 30.

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### DISEASE PREVENTION.

MCKINLAY (R.). **A Brief History of the Interallied Sanitary Commissions in Turkey, abstracted from the Annual Report of the Sanitary Commissioner, Constantinople, for the Year 1922.—*Jl. Roy. Army Med. Corps.* 1924. May. Vol. 42. No. 5. pp. 359-373.**

This paper deals with the experience of the Allied Sanitary Commission in Constantinople during the occupation of the allied troops. As usual where an army goes, sanitation comes in for a general overhaul. The old arrangement of partly Municipal and partly Governmental sanitary control, both of which departments were completely bankrupt, had to be replaced by something more active; consequently the existing organization was strengthened by an Inter-allied Sanitary Commission which took over such matters as street cleaning, municipal hospitals, attendance of the poor, public vaccination, burial services, investigations of shops and bakeries, etc., and infectious diseases except plague, cholera, typhus and relapsing fever, which came under the department of "Service de Santé Publique Ottomane."

The sanitation of Constantinople itself left much to be desired. The drainage system was crude and entirely inadequate; a great deal of the sewage soaked straight into the ground though drains of an altogether dilapidated and unsystematic nature existed.

The water supply is derived from three sources. The Derkos supply comes from Lake Derkos, some 20 miles distant from the town; the water is unfiltered. The Evkaf supply originated in a series of artificial reservoirs in Belgrade Forest and the reservoirs and conduits were in a deplorable state of disrepair. It was possible to find coli bacteria present in 0.5 cubic centimetres in both supplies.

Wells exist all over the town, and the quality of the water from these may easily be imagined.

Naturally the writer very much dreaded the importation of cholera ; every possible protection was taken against it in refugees. The faeces of every person on arrival at the port was examined in the laboratory. Up to the end of September 11,179 such examinations had been carried out, with the result that 17 cholera carriers and 10 carriers of a non-agglutinating vibrio were isolated. This entailed a great deal of work and a certain amount of inconvenience to the people. Nobody was allowed to proceed until pronounced non-infective ; 18,018 cholera inoculations were carried out ; 23 cases of the disease were actually removed from ships in the harbour. 29 cases of plague with 10 deaths occurred. Examination of 200 rats showed that none was infected, though the writer considers that in parts of the town the rodents were probably suffering from the disease ; 107,676 inoculations were carried out. As regards typhus, at no time during the year did it assume alarming proportions ; 4.5 cases per week was the average, with a maximum of 22. Considering the overcrowded conditions of the town and the semi-starving and filthy condition of the refugees, this must be considered satisfactory. A small amount of relapsing fever and 704 cases of smallpox occurred. Enteric was very prevalent ; during July to October 840 cases occurred, and the writer is of the opinion that there were actually many more. Whether it was water borne or fly borne has never been definitely settled ; 86,154 persons were protected by inoculation.

No less than 360,000 refugees came into Constantinople from the Crimea in 1919. During the Greek offensive in 1921 65,000 Greek and Turkish refugees arrived ; in February 1922 20,000 Armenians, and as a result of the Turkish victories in the latter months of 1922, another 100,000. It is easier to imagine than describe the condition of the sanitary arrangements. The author remembers a ship of 1,500 tons which had on board 4,500 Greek refugees (her normal complement of passengers would be about 60) ; 27 cases of relapsing fever, 2 of smallpox, 7 of cholera, besides many other non-infectious cases, were taken off this boat alone. While it was lying in the Bosphorus 41 deaths occurred, and the writer was informed that before disembarkation at a Greek Island there were 800 more.

8,000 to 9,000 dogs were destroyed in the city, as rabies was fairly common ; a Pasteur Institute was established ; 1,709 people made use of it in the first year and 899 were actually treated for rabies.

" The director of the institute lays stress on the fact that all authorities appear to agree that although birds can be inoculated with rabies, they never show any clinical symptoms. He illustrates this by the case of a child who was bitten on the face by a cock and who was brought to him by the parents, who wished to know whether or not treatment was necessary. He inoculated a rabbit from the brain of the bird and the rabbit died of rabies on the ninth day."

**PROCEEDINGS OF THE ASSAM BRANCH OF THE BRITISH MEDICAL ASSOCIATION. Annual Meeting, Jorhaut, 16th & 17th February 1924.—49 pp.**

The Assam Branch of the British Medical Association seems to be an extraordinarily flourishing and virile off-shoot from the parent stem. The proceedings of their yearly gathering are always of very great interest and the papers read excellent. This year is no exception to the rule.

Two members of the staff of the Calcutta college, namely, Major SHORTT and Major ACTON, read papers, the former on the "Present position as regards the problem of transmission of kala azar," and the latter "Some recent advances in the diagnosis and treatment of the commoner tropical disease." The former of these we do not propose to notice, because it will be reviewed elsewhere.

The latter gives some extremely useful advice on such commonplace diseases as dysentery, ankylostomiasis, etc. He writes:—

"Dr. MacVail of our School has conducted a useful piece of work on the fertility of the female hookworm. By this work he is now able to tell us when mass treatment should be employed, *i.e.*, before the monsoon.

"Dr. MacVail tested the relative values of chenopodium and  $\text{CCl}_4$ , and his results may be briefly summarised as follows:— $\text{CCl}_4$  costs Rs. 3-8 a lb. and is given in two consecutive doses of 70 minims, on each day. In all 140 minims are given to effect a cure.  $\text{CCl}_4$  should be followed by a purge. It is a specific for hookworm and oxyuris. The disadvantages are that it should not be given to people suffering from inefficiency of the liver or to persons addicted to alcohol. There have been several cases reported amongst your coolies who suffering from the intoxication of  $\text{CCl}_4$  complete it still further by an alcoholic bout, and suffer from toxic symptoms. This symptom of giddiness that is produced by  $\text{CCl}_4$  is a distinct disadvantage, as it means that the men have to be off duty for 48 hours. Chenopodium, on the other hand, costs Rs. 35 a lb., and is given in 10 minim doses in capsules at intervals of an hour up to 30 minims. It is necessary to repeat the course weekly for two more doses. It is contraindicated in kala-azar, and it is a specific for anchylostomes and roundworms. The advantages are that no purge is necessary, and [only] occasionally slight symptoms are produced, so that there is no loss of labour. The disadvantages are the additional expense of the drug and that it has to be given in capsules."

Under the head of leprosy the writer makes the statement that at least 10 per cent. of the population attending the general skin department in Calcutta are suffering from leprosy, that this disease is primarily a skin disease and ought to be diagnosed with the aid of the microscope in the early stages of the disease. As a matter of fact, it is very frequently overlooked at this period.

Dr. Malcolm WATSON read a paper on his experience in antimalarial work in the Federated Malay States. He points out that the conditions in Assam and Malaya are similar in many respects; at any rate, *Anopheles maculatus* is common to both countries. A paper by Dr. FORSYTH on some "Principles of preventive medicine in Assam," and by Dr. HERMITTE on a "Discussion on the benefits of centralisation of serious sick in Tea Garden Practice," and finally an extremely interesting paper on "Chloroform administration and its dangers," by Lieut.-Col. PALMER make up the number.

ABBATUCCI. **Sur le protection de la main-d'œuvre indigène en Afrique.**—*Presse Méd.* 1924. May 31. Vol. 32. No. 44. (Supplément.) pp. 923-925. [1 ref.]

The writer points out that the population of French West Africa is extremely sparse—3 inhabitants to the square kilometre and 1 per square kilometre for French Equatorial Africa. Obviously, therefore,

it is in the interest of everybody to protect as far as possible the labourer in these Colonies. He proceeds to deal with the various arrangements of recruiting, passing the labourer on to his working centre, medical inspection required on arrival; housing accommodation is also discussed, and the ration. He quotes the one used in Belgian Congo at Katanga.

Manioc Flour	...	7,200 gm.	Vegetables or fruit	1,000 gm.
Beans	...	500 "	Fresh Meat	...
Peanuts	...	500 "	Salt	...
				105 "

This ration is variable; the flour may be replaced by maize flour or rice; the beans by peas or lentils; palm oil may be substituted for peanuts, and fresh fish or dried fish for meat. The above diet is certainly liberal.

Preventive measures against ticks, mosquitoes and body lice, etc., are also described, and the more important medical organizations in the event of sickness.

**BULLETIN OF THE PUBLIC HEALTH ASSOCIATION OF AUSTRALASIA.**  
1923. July. Vol. 1. No. 7. pp. 1 & 3. With 1 plate.—**An Interesting Public Health Movement.**

"On the opposite page is reproduced a few of the leaflets and booklets issued by the Colonial Mutual Life Assurance Society for the benefit of their policy-holders. (Fig. 51.) Public Health workers who are conversant with the magnificent work done by the Metropolitan Life Assurance Company of the U.S.A. on similar lines will heartily welcome this movement on the part of the Colonial Mutual Life. We know from the experience of the Metropolitan Life what great and lasting good is done by this class of Health propaganda.

"In nine years this concern issued 187,824,532 pieces of Health Literature; gave nursing care to 1,350,192 policy-holders, and paid 6,076,583 visits to those policy-holders.

"Of course, the Colonial Mutual Life will never attain such figures—at least not for many, many years, but in proportion it is doing great and valuable work. Since the foundation of the Welfare Service Department, which deals with the work, twenty-two months ago over 500,000 pieces of literature have been issued and visits to policy-holders are being made at the rate of 5,000 per annum."

**BENGAL. Bengal Public Health Report** [BENTLEY (Charles A.), Director of Public Health], **Bengal Sanitary Board Report** [GOODE (S. W.), President], and **the Report of the Chief Engineer, Bengal Public Health Department for the Year 1922** [WILLIAMS (G. B.), Chief Engineer].—pp. iii + 66 + xxxix + 7. With 62 charts. 1924. Calcutta: Bengal Secretariat Book Depot. [Price Rs. 3-8.] [Malaria.]

"*Malaria increases after drainage and diminishes after flushing.*—It has been known for hundreds of years that the draining of swamps involves a grave risk of increasing malaria unless the work is done so thoroughly that the land will either grow dry crops or at least be fit for pasture. On the other hand, ever since Empedocles flooded the lowlands surrounding Selinos and in this way made the city healthy it has been known that swampy tracts may be freed from malaria by flushing them with an abundant supply of water.



FIG. 51.—Reproduction of some of the health literature which the Colonial Mutual Life Assurance Society, Australia, issues from time to time to industrial policyholders.

[Reproduced from the *Bulletin of the Public Health Association of Australasia*.]

"We now have definite proof of these two facts in Bengal, as may be seen by the inserted blocks [Fig. 52], which show the increase of malaria that has followed drainage in two separate localities, and on the other hand the great diminution of malaria that has occurred at Kumarkhali since the carrying out of a small scheme for the purpose of flushing out the drains, ditches and hollows in and about the town, with an abundant supply of water from the river."

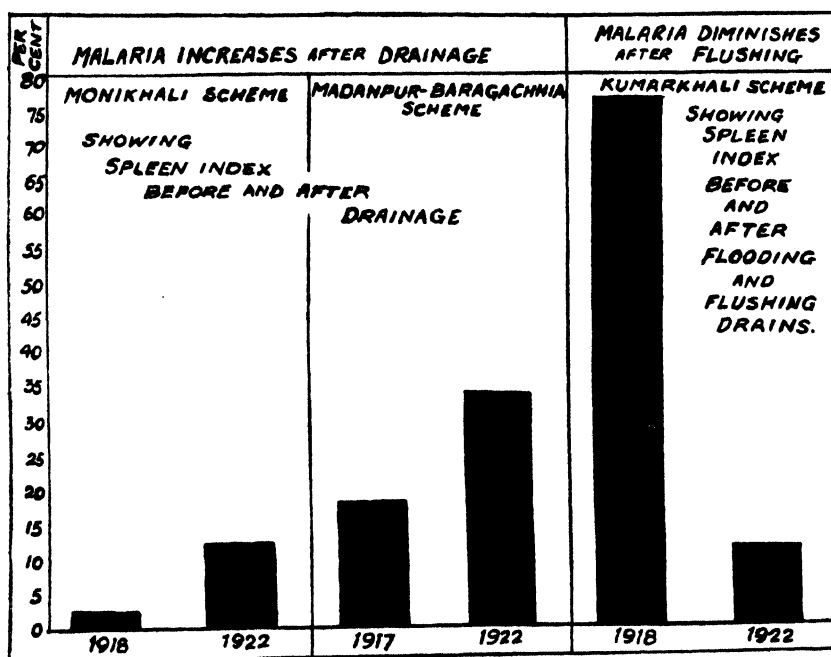


FIG. 52.—Comparison of increase in spleen index in two areas following drainage, with decrease in an area following flushing with an abundant supply of water.

[After diagrams in the *Bengal Public Health Report for 1922*.]

Malaria in the Province of Bengal shows a strong tendency to increase, and, indeed, is becoming more prevalent in places that were formerly free. The writer's explanation of this is as follows:—

"Some causes of increased malaria.—Probably there are many factors concerned in the increase of malaria in Bengal districts, but some of these factors can be easily recognised. For example, in the low lying swampy parts of Bengal interference with the natural flow of water across country from field to field, the obstruction or silting up of water-courses, and any condition, in fact, that seriously diminishes the supply of water and promotes stagnation, whether it be on the land surface or in the beds of streams and drainage channels, leads to a local increase of malaria. Again and again during the last 60 years the construction of embankments has produced this condition of things, and the outbreaks of epidemic fever that have resulted have been subsequently followed by a permanent increase of endemic malaria.

The inset block [Fig. 53] indicates in a diagrammatic manner the comparative frequency of embankments in the several natural divisions of the province, and if we compare it with the map showing the relative prevalence of malarial disease in the various districts, it will be seen that the eastern portion of the province, which possesses the fewest embankments, is far less malarious than all the areas to the west, where embankments of all kinds are much more numerous. *Prima facie*, it would appear, therefore, that there is good ground for the current belief that embankments conduce to malaria.

### DISTRIBUTION OF MALARIAL DISEASE IN BENGAL



### COMPARATIVE FREQUENCY OF EMBANKMENTS IN BENGAL

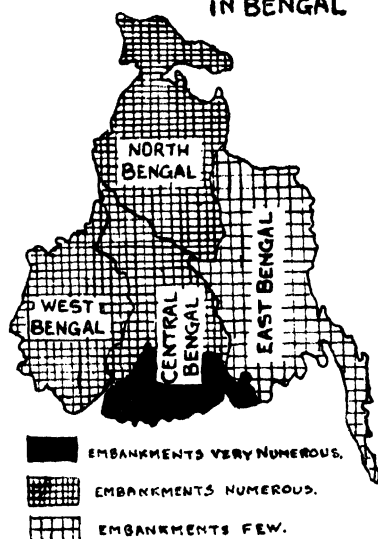


FIG. 53.—Comparison of distribution of malaria with frequency of embankments in Bengal.

[After diagrams in the *Bengal Public Health Report for 1922*.]

Embankments obviously obstruct the flow of water and tend both to diminish the supply of moisture to the areas situated below them as well as to promote general stagnation. And this result may follow the adoption of protective river embankments or the construction of embanked roads and railways. It is noticeable that epidemic malaria has now appeared in parts of Eastern Bengal where railways have been constructed in recent years."

PHILLIPS (J. A. S.). **On the Results of Anti-Malaria Measures in Five Towns in the United Provinces.**—*Indian Med. Gaz.* 1924. May & June. Vol. 59. Nos. 5 & 6. pp. 221-228. With 3 maps. pp. 273-278.

In the years 1909-14 a great deal of work was done in the study of malaria in various towns in the United Provinces by the late Lt.-Col. J. C. ROBERTSON and Lt.-Col. GRAHAM. The following towns were reported upon—Saharanpur, Basti Nagina, by Col. ROBERTSON,



Kosi, Meerut and Lucknow by Col. GRAHAM. The writer of this paper refers to the recommendations made by the officer originally reporting on the situation and discusses the improvement in health that has taken place. In most cases the recommendations have been carried out with most excellent results.

In practically every town the birth rate has gone up, the fever death rate and total death rate have gone down, and the spleen rate amongst children and the parasite rate have dropped very greatly. The results are most gratifying, and it speaks well for the care with which the original investigations were carried out and the soundness of the conclusions arrived at.

In the case of Saharanpur Col. ROBERTSON suggested the stoppage of canal irrigation at within  $\frac{3}{4}$  mile of the edge of the city. This was carried out until quite recently, when the order was repealed. The writer of the article points out that the permitting of irrigation in this area is a decidedly retrograde step and will certainly do away with much of the good that resulted from the original report.

	Year.	Total number of children examined.	Number with enlarged spleens.	Percentage with enlarged spleens.
Saharanpur ...	1909	2,665	2,101	78·8
	1923	2,720	198	7·3
Nagina ...	1909	1,957	1,543	79·1
	1923	1,038	140	13·49
Kosi ...	1910	964	784	81·3
	1923	480	204	42·5
Meerut ...	1911	5,494	325	5·9
	1923	3,126	41	1·3

Meerut Areas.				Percentage with enlarged spleens 1911.	Percentage with enlarged spleens 1923.
A	...	...	...	18·9	2·4
B	...	...	...	10·4	1·8
C	...	...	...	16·4	1·4
D	...	...	...	4·7	0·5
E	...	...	...	5·8	1·2
F	...	...	...	7·3	Nil.
G	...	...	...	4·4	0·9
H	...	...	...	4·0	1·5
K	...	...	...	2·5	1·3

#### Parasite Rate.

	Year.	Parasite rate. Per cent.		Year.	Parasite rate. Per cent.
Saharanpur ...	1909	53·8	Kosi ...	1910	26·0
	1923	10·3		1923	6·5
Nagina ...	1909	44·4	Meerut ...	1911	6·0
	1923	6·0		1923	3·0

Lucknow. In 1913 Major GRAHAM found 2·2 per cent. of the children had enlarged spleens; in 1923 1·6 per cent. Neither Lucknow nor Meerut were originally what may be called very malarious towns as compared with the others.

SHORTT (H. E.). **The Occurrence of Malaria in a Hill Station.**—*Indian Jl. Med. Res.* 1924. Jan. Vol. 11. No. 3. pp. 771–789. With 5 charts, 2 plates & 1 sketch map.

The author deals with the increase in the prevalence of malaria in Shillong. This station is situated about 5,000 ft. above sea level and is a health resort. Recent figures obtained by observing the blood slides sent to the Pasteur Institute show that there has been a decided increase in the number of malignant tertian infections during recent years. In 1922 the disease was more prevalent than usual.

The writer considers that the floating population at the Pasteur Institute, which is comprised of people from all parts of Assam who come for treatment after being bitten by rabid animals, is a source of infection, as many of these people are parasite bearers.

The mosquitoes found in Shillong are as follows:—*Anopheles maculatus*, *fuliginosus*, *gigas*, *minimus*, *rossii*, *rossii*, var. *vagus*, *lindesayi*, *sinensis*, *aikhenii*.

In the opinion of the author *A. maculatus* is the species which probably spreads the disease, although a number of dissections taken late in the year do not show many infected specimens. The small streams, the Um Kra and the Um Shirpi, are the main breeding places of this species; the rice fields in the neighbourhood may at times contribute their quota.

PALESTINE. **Proceedings of the Ninth Meeting of the Antimalarial Advisory Commission, 22nd May 1924.** [HERON (G. W.), Director of Health, President.] [MS. received from Dept. of Health, Jerusalem.]

These Proceedings are, as usual, extremely interesting. The passage quoted shows the work that has been done:—

“Mr. Briercliffe said that the malaria incidence throughout Palestine was lower in 1923 than in any previous year since the Occupation. In no part of the country did the disease appear in epidemic form. The nearest approach to an epidemic was an outbreak of benign tertian malaria at Hedera in June and July, which was traced by the Malaria Research Unit to a neighbouring swamp. The swamp had since been drained. Haifa was the only large town in which new infections were reported to any extent, and considerable efforts—of which Dr. Carley would speak later—were made to deal with the breeding places there.

“The low incidence in 1923 was attributable largely to the small rainfall in the preceding winter. In Jerusalem less than 20 inches fell during the season, as compared with an average annual rainfall of 26·6 in.

“In certain districts, however, and in all the towns, the diminution of malaria was chiefly due to the measures taken to deal with the disease. This was particularly the case in the Jezreel Valley, where the extensive drainage works had brought about a most striking fall in the incidence of primary malaria among the settlers.

“With regard to the routine measures carried out by the Department of Health, in spite of a reduction during the previous two years in the number of its sub-inspectors from 36 to 22, more routine work was undertaken than in any previous year.

“In the towns 933,236 inspections were made, as compared with 847,521 in 1922. In the course of these inspections *Anopheles* larvae were found on only 1,462 occasions, as compared with 4,301 occasions

the previous year. The diminution in the extent of *Anopheles* breeding had been very definite during the last few years. In 1921 the larvae were found once in every 1,400 inspections, in 1922 once in every 2,000, and in 1923 once in every 6,600. During the year 6,792 additional wells, cisterns, cesspits and other places were discovered in the towns, and at the end of the year there were 44,498 such places on record.

"27,336 possible mosquito breeding places were made mosquito proof and 867 pumps installed on wells and cisterns. It was satisfactory to note that of the 4,690 town wells and 11,705 cisterns on record, 60 per cent. of the wells were mosquito-proof and over 30 per cent. fitted with pumps, while 36 per cent. of the cisterns were mosquito proof and 29 per cent. had pumps fitted. As the result of the greater number of wells and cisterns mosquito-proofed, the number of places to be oiled had decreased. Only 478,735 oilings were performed and 30 tons of oil mixture used, as compared with 508,222 oilings and an expenditure of 45 tons of oil in 1922.

"The work carried out in the villages amounted to about the same as that done in 1922. 13,305 visits were made to villages by the sub-inspectors and 148,251 oilings performed, as against 13,219 visits and 146,543 oilings the previous year. Of 18,928 potential breeding places on record at the end of the year 9,987 were stated to be mosquito-proof.

"During the last two or three years the Government expenditure on antimalarial measures had been reduced from some £10,000 to £3,500, but the Municipalities were now assisting with the work in the towns and providing the necessary unskilled labour and oilers, and financial support for antimalarial work in Palestine was also being received from the Rockefeller Foundation and the Jewish Joint Distribution Committee of America, who maintained the Malaria Survey Section and Malaria Research Unit respectively."

It is noticed that the fitting of pumps to water supplies is one of the standard sanitary measures used in Palestine. It will be interesting to know whether these are an entire success. Experience in the tropics shows that unless they become the private property of an individual they do not last very long; the treatment received at the hands of the public very rapidly renders them useless.

The paper by Dr. KLIGLER on the Flight of the *Anopheles* will be reviewed elsewhere.

STEINMETZ (H. H.) & TIEDEMAN (W. D.). [In English & Spanish.] **Del Carmen Malaria Survey. Data developed by the Co-operative Efforts of the Philippine Health Service, Pampanga Sugar Mills, and the International Health Board of the Rockefeller Foundation. Investigación de la malaria en Del Carmen.**—*Jl. Philippine Islands Med. Assoc.* 1924. Apr. Vol. 4. No. 4. In English, pp. 142-145; in Spanish, pp. 164-165.

The paper gives an account of the malaria in Del Carmen. The following varieties of anopheles are found:—*A. barbirostris*, *A. sinensis*, *A. minimus* (commonly called *A. febrifer*), *A. maculatus*, *A. fuliginosus*, *A. philippinensis* and *A. rossi* (including the var. *ludlowii*).

The important fact was very early ascertained that comparatively few mosquitoes bred in sugar cane cultivations. As regards gamete carriers, the following were the percentages of persons with malaria parasites: Pabanlag 28.9; Prado 14.4; Pulungmasle 20.5; San José 23; and Tucop 39.9.

"The best figures we have to show this [high malaria incidence] are from two haciendas which maintain small hospitals under the supervision of the company surgeon. In one of these, during a period of 115 days, 175 persons had attacks of malaria and spent an aggregate of 1,301 days in the hospital. This number represented about 30 per cent. of the population, and each person averaged 7.5 days under treatment. On the other hacienda, 218 persons had one or more attacks of malaria during a period of 100 days. These persons represented approximately 33½ per cent. of the population, and were on sick call during this period for a total of 913 days, or an average of 4.2 days per person. . . .

"The first [suggestion] is that planters might develop contiguous areas unsuitable for cane, for food crops, thus giving their labourers something to do during the cane-growing season and making them permanent residents. The yearly importation of labour from other malarial sections is a great factor in increasing malaria incidence. The second suggestion is that cane areas be extended, leaving as little waste land as possible, since land under good cultivation is much less likely to present mosquito-breeding places. This reduction of mosquito breeding by agricultural drainage will bring the time nearer when it will be economical to control malaria by mosquito control."

HOLDEN (C. W.). **The Prevention of Malaria with a Division in the Field.**—*Jl. Roy. Army Med. Corps.* 1924. Apr. Vol. 42. No. 4. pp. 259-265.

This paper contains an account of the antimalarial measures used by the troops near Lake Doiran in Macedonia. The writer does not claim that there is anything very new about them; but from an administrative point of view they are of great importance.

The campaign included personal and antilarval or antimalarial measures. The personal campaign largely turned on:—

"1. The use of bivouac, hospital pattern and bell tent mosquito nets.

"2. Mosquito-proof dug-outs and huts.

"3. Head-nets, gloves and turn-down shorts.

"4. Mosquito repellant substances such as ointments and oils.

"5. General hygienic measures such as attention to cooking, gardening by the troops to provide fresh vegetables, amusements (we had a perfectly wonderful theatrical company and theatre).

"Protection from the sun. Reeds were cut from Lake Ardzan, thatching classes were instituted, and corrugated iron dug-outs and huts were thatched and open-air dining shelters made. The difference which this made to men living under corrugated iron roofs in the sub-tropics can be imagined."

As regards the antilarval campaign, all the usual measures were employed, including cutting of reeds, oiling, trenching, etc. It must be remembered that many of the places to be treated were actually under enemy fire; consequently the work had to be done at night. Antimalarial measures are sufficiently troublesome under ordinary circumstances; to undertake them under fire must very considerably increase the difficulty, even though it may add to the excitement. The most important discovery of the campaign and one that is not generally known is that cresol in very dilute solution is a very powerful larvicide. The following results are given in the article; they were obtained by Major MAYNE, R.A.M.C.

" One ounce of cresol in one cubic foot of water (=1 in 1,000) killed larvae within two minutes.

" One ounce of cresol in ten cubic feet of water (=1 in 10,000) killed larvae within fifteen minutes.

" One ounce of cresol in 100 cubic feet of water (=1 in 100,000) killed larvae within one hour.

" One ounce of cresol in 1,000 cubic feet of water (=1 in 1,000,000) killed larvae within four hours.

" One ounce of cresol in 10,000 cubic feet of water (=1 in 10,000,000) killed larvae within twelve hours."

The writer considers that cresol used in this way is much superior to ordinary kerosene oil. He quotes the case of a marsh, originally borrow pits on the edge of Lake Doiran, which was treated with cresol during the night by a small sanitary squad. The results were much superior to anything that could have been done with oil, as the enemy's fire prevented removal of the vegetation and all antimalarial measures had to be carried out during the hours of darkness.

CONNOR (M. E.). **Suggestions for developing a Campaign to control Yellow Fever.**—*Amer. Jl. Trop. Med.* 1924. May. Vol. 4. No. 3. pp. 277-307. With 8 figs.

This is a very detailed account of the administration and organization of a anti-yellow fever campaign. The writer gives his own recent experience in Merida, Mexico, but refers to other work done in Central America. Details of the organization, which is applicable to all large cities, are given in the author's own words.

" *The District Plan* is especially applicable to large cities and is in the nature of a permanent organisation. The plan of administration may be arranged as follows :—

" 1. The city is divided into districts, with one inspector and one or more assistants in each district. Or, the city may be divided into three large districts, and each district subdivided into zones, with a supervising inspector for each district.

" 2. The number of districts will depend upon the number of buildings to be inspected and upon their size and distribution.

" 3. The average sanitary inspector can visit and carefully inspect about 75 homes or apartments in the early weeks of the campaign, but as the inspector becomes proficient in his work the number of houses inspected daily will increase. It is a grave error, however, to judge the inspector's efficiency by the number of homes visited, *i.e.*, to give undue credit to him who inspects the greatest number.

" 4. The cycle of inspection for the first few months of the campaign should be definitely fixed at seven days, including Sunday and half day Saturday ; in other words, the area is covered in five and one half or six days. The central office should insist on this. The period of evolution from the egg to adult mosquito should be worked out for each community, and the cycle of inspection can be arranged accordingly. It is rarely ever under seven days, but during low temperature periods it is frequently as much as twelve days.

" 5. The inspections should start in each district on the same day and at the same hour and the cycle should terminate in all districts seven days later. It will sometimes happen that an inspector is delayed in his district, in which case additional help should be sent into that

district. The inspection cycle arranged as above is good discipline for the men and is greatly appreciated by the public, as they soon learn when to expect the inspector and thus eliminate long delays.

"6. The inspectors are under the immediate supervision of the inspector-general. The inspectors should be visited in their districts at least twice daily by the inspector-general, and he should note the time of his visit over his signature on the district inspector's daily report. The inspector-general should accompany the district inspector into a few homes to note the character of work being accomplished, and by discreet inquiries of the occupants he will sometimes hear suggestions for improving the service. The inspector-general should also adjust any minor differences that may arise between the public and the district inspector.

"7. In a large organization a revising inspector will be found to be of real service. His duties are to check the work of the district inspector, by carefully inspecting between 200 and 300 houses in each district. A plan which some directors have found of service is to detail the revising inspector with an assistant to a district for one or two days and to submit a report on the results of this inspection. The revising inspector always works independently of the district inspector.

"8. The duties of the district inspector are to inspect carefully every habitation in the area assigned to him, examining personally every receptacle used or intended for storing water. The receptacles found to contain larvae are to be treated in accordance with instructions given him by the central office. The inspection of the homes at the beginning of a campaign should include inspection of every room, as there may be flower vases and similar receptacles in which mosquitoes are breeding, and which would be passed over unless attention is called to them.

"9. Each member of the campaign personnel should carry with him an identification card signed by the proper authorities, and on this card should be quoted the law which authorizes him to enter houses. Each district inspector should carry a list of printed instructions issued by the general office outlining the methods of mosquito-proofing the different classes of water receptacles. On this same list there might be printed indications to the inspector on meeting objections of refractory persons, etc. (A copy of instructions used in Merida, Yucatan, Mexico, is given herewith.)

"10. At the close of each inspection cycle a general conference is held in which all members of the service take part. At these conferences the problems encountered in the work are reported and discussed, and suggestions for improving the service are received and acted upon. Many suggestions offered by the inspectors in the Guayaquil and Merida campaigns have proved of real worth and are in practice to-day."

Upon the subject of fish as larva eaters the following remarks are made:—

"The majority of the top-feeders belong to the minnow class of fish, of which the *Gambusia nicaraguensis* and the *Mollienesia latipinna*, Le Sueur, have given the best results. Of the bottom-feeding fish, the *Cichlosoma urophthalmus*, more generally known as the "mojarra," and the *Dormitator maculatus*, commonly known in Mexico as the 'goby,' have given excellent results. The top-feeders are more consistently successful when placed in barrels, fountains, or earthenware jars to which the sun has free access, while bottom-feeders can and do.

live in the light as well as in the dark, and their preference for a position at the bottom of a container makes them less liable to accidents. There is this additional advantage, that mosquito larvae usually feed near the bottom of a container. Top-feeding fish do not as a rule continue active if forced to hunt their prey at a depth. In the Guayaquil campaign only bottom-feeders were used, but in Mexico both classes have been tried and the consensus of opinion is that the bottom-feeders are the more dependable. In an emergency, however, no distinction should be made until the crisis has been passed, when the proper fish for each class of receptacle can be used."

"The following procedure in distributing fish was successful in the Merida campaign:—

"a. Underground cisterns, one fish only, preferably male mojarra (bottom-feeder).

"b. Well, water entering from below, two or more top-minnows (top-feeders).

"c. Well, receiving water from the roof or patio, two or more bottom-feeders.

"d. Barrel, one fish only, mojarra (bottom-feeder).

"e. Fountain, swimming pool, earthenware jars, etc., two or more top-feeders."

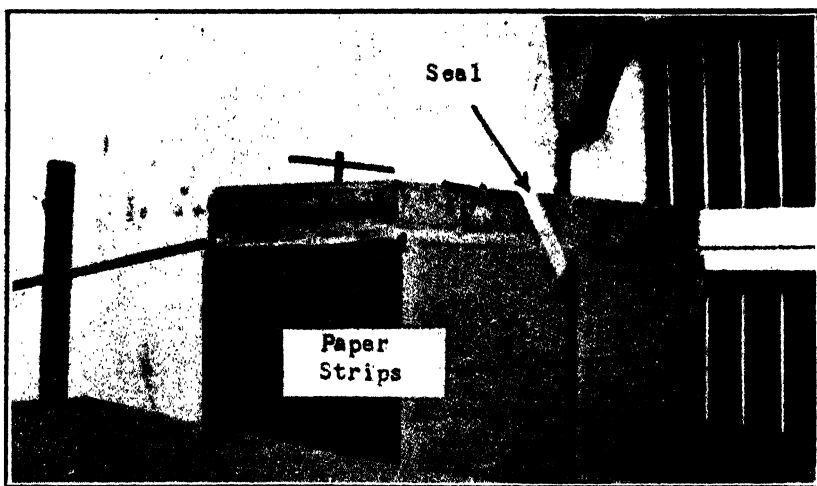


FIG. 54.—Type of interior cistern used for storing water in Guayaquil. After careful adjustment of cover to exclude mosquitoes two strips of paper, about 5 inches long by 2 inches wide, are pasted on the tank so that the cover cannot be raised without breaking the seal. On the strips of paper are printed instructions to the inspector that if the seal be found broken the receptacle is to be carefully searched for mosquito larvae, and to the occupants of the house not to remove or break the seal without written permission of the central office.

[Reproduced from the *American Journal of Tropical Medicine*.]

It is recognized, however, that the use of fish for cisterns and indoor tanks is an emergency method only. For routine purposes the mosquito-proofing of these receptacles by fitting them with properly adjusted covers of galvanized sheet iron, or good copper wire cloth, or wood is recommended. To eliminate the need for constant

inspection, these covers, after careful adjustment by the inspector, are sealed with adhesive strips (see Figs. 54 and 55) so that any tampering with the cover between the visits of the inspector may be easily detected.

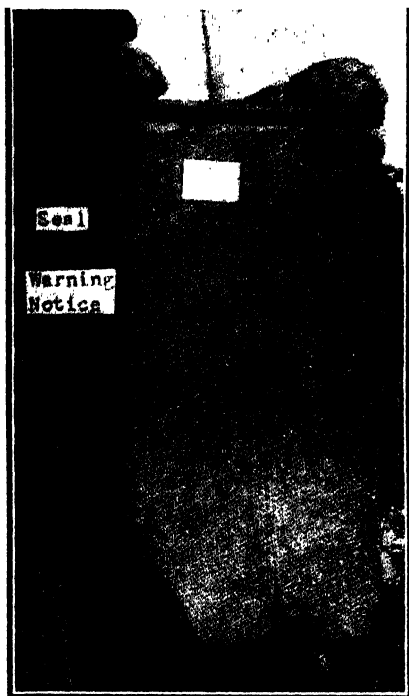


FIG. 55.—Type of water container in Merida, exposed to the elements. Here adhesive slips resistant to the fierce heat and torrential rains are used for sealing the covers. The ends of the slip are covered with a red putty and impressed conspicuously with the official seal of the Department of Health, so that the least tampering with the cover will be detected. A notice is posted on the cistern to the effect that the cover must not be moved without permit from the central office.

[Reproduced from the *American Journal of Tropical Medicine*.]

The next point dealt with is the various containers in the town of Merida. These consist of all sorts of arrangements for storing water for drinking purposes and the lye water used for softening the supply before washing clothes. It was found that if this lye water was too strong larvae would not develop in it, but when it was diluted the mixture for some unknown reason was particularly attractive to *stegomyia*. Various methods of overcoming the difficulties are mentioned. The use of soap in the lye-water was found to be most successful, as a little soap-suds will kill larvae.

The writer next gives an account of the well-known habits of the intimately domestic *Aedes aegypti* (*Stegomyia fasciata*). Its breeding-places in Merida are, in order of preference, (a) underground cisterns, (b) surface cisterns or tanks, (c) barrels, (d) lye water containers, (e) wells, (f) other receptacles. Tanks on roofs of abandoned houses and



some distance from the ground appear also to be included; but puddles and rain pockets, cesspits, etc., are not commonly used.

"At the present time there are a number of *Stegomyia* indices in common use, *i.e.*, (a) density index, (b) deposit index, (c) house index, (d) pupae index. They may all be stated in percentages:—

"a. The *density index* is widely employed and is arrived at by comparing the total number of houses visited with the total number of receptacles found to contain mosquito larvae. This index gives the highest ratio of the four, as frequently two or more breeding-places will be found on the same premises.

"b. The *deposit index* gives the lowest ratio and is arrived at by comparing the total number of receptacles examined with the total number of breeding-places noted.

"c. The *house index* is the ratio of infested houses, *i.e.*, dwellings found harbouring fresh-water receptacles containing larvae, to all houses examined.

"d. The *pupae index* can be easily reached by comparing the total number of receptacles examined with the total number found containing pupae.

"An illustration of computing mosquito indices follows: If on a certain day 2,812 homes have been visited, and of this number 177 are found to have receptacles breeding mosquitoes, the *house index* will be 6.2 per cent. The same day there were 7,770 fresh-water receptacles examined, and of this number 258 were found containing larvae giving a *deposit index* of 3.3 per cent. The density index will be the number of houses visited (2,812) divided into the number of deposits found breeding mosquitoes (258), thus giving a percentage of 9.1. The *pupae index* will be the number of receptacles examined (7,770) divided into the number of receptacles in which pupae were noted—in this instance 129—giving a rate of 1.6 per cent. In other words, nearly 2 per cent. of all fresh-water receptacles in the area under question were liberating adult mosquitoes."

MOLLOY (Daniel M.). **Some Personal Experiences with Fish as Anti-mosquito Agencies in the Tropics.**—*Amer. Jl. Trop. Med.* 1924. Mar. Vol. 4. No. 2. pp. 175–194. With 6 text figs. [7 refs.]

This paper gives an account of control of malaria. It is pointed out that long before Ross's epoch-making discovery of the means of transmission of malaria intelligent people in the Southern States of America used fish to keep down the wrigglers in their tubs and artificial storage tanks. Apparently the Chinese were amongst the earliest to recognise the efficiency of gold fish, and it is suggested that probably they brought the custom into Barbadoes. The inhabitants of this island improved on the goldfish by making use of millions, and its immunity from malaria may possibly be due to this cause.

The paper then goes on to describe the work done by the author in the summer of 1915 in Nicaragua, particularly in the town of Corinto. In this campaign he used gambusia in the orthodox manner. Later, in 1919, a yellow fever epidemic broke out and a small viviparous top feeder (*Poecilia sphenops*), known locally as "olomina," was made use of. They are found all over Nicaragua in streams above tidal waters. They are very hardy, stand transport very well and are very voracious feeders. When they were first put into small water vessels they invariably jumped out, but by quietly "taming" them, that is by making the transmission from streams to small vessels through a larger tank,

in three days they got accustomed to their surroundings. During this period the children of the house were sent frequently to the tank to accustom them to the sight of human beings. The fish were carried many miles in tins both by rail and by motor car, with a very small mortality during the journey. The writer also made use of a small perch "mojarra," as a bottom feeder for mosquitoes. In one campaign in several towns in Central America he stocked no less than 50,000 containers with approximately 300,000 fish. Malaria and yellow fever were also influenced by this campaign.

In the use of fish it is pointed out that many factors must be taken into account, the most important being the number of fish supplied and the quantity of the food supply. If the food supply is low in amount no vegetation or algae or anything else will prevent fish from hunting mosquito larvae. On the other hand, if the food supply is plentiful and the number of fish small, they will not hunt satisfactorily. Consequently in all natural sources of water it is desirable to put in a shoal of both sexes. As long as conditions are satisfactory the increase in numbers is very rapid indeed. The writer has seen these Poeciliidae travelling up streams where the ground was only just covered with seepage water in pursuit of larvae. In an estate in Grenada belonging to the Menier Chocolate Co. the irrigation channels for the cocoa plant are swarming with fish; without this he is perfectly certain that the staff would not be able to live on account of the virulence of malaria.

HORN (A. E.). **A Simple Device for the Mosquito-Protection of Water-Tanks, Casks, etc., without the Use of Gauze.**—*Jl. Trop. Med. & Hyg.* 1924. June 16. Vol. 27. No. 12. p. 175. With 1 text fig.

A simple and ingenious apparatus is described for admitting water to a storage tank but closing automatically and keeping mosquitoes out. As the writer points out, metal gauze is frequently an entire delusion because it very soon rots through and it tends to block up and stop the flow of water altogether.

"The accompanying photograph (Fig. 56) illustrates a simple apparatus which I have designed and used in the above cases, doing away entirely with the gauze protection and proving entirely satisfactory.

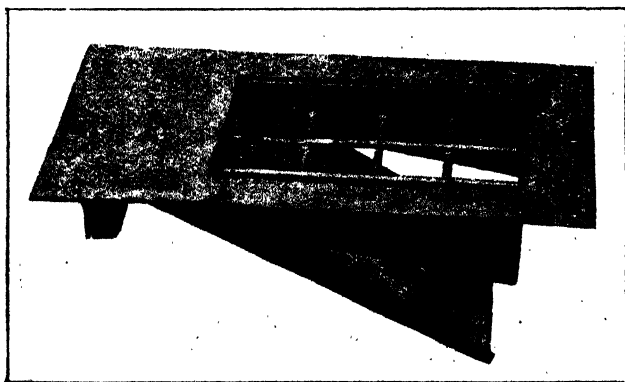


FIG. 56.—Apparatus devised by Dr. A. E. HORN for the mosquito-protection of water-tanks, casks, etc.

[Reproduced from the *Journal of Tropical Medicine and Hygiene*.]

" It consists of a thin metal plate roughly 11 in. by 8 in. in size, with an opening in it about 6 in. by 5 in. On the under surface a flange is welded around this opening 1 in. deep at one end with sides deepening to 2 in. at the opposite end. Impinging against the under surface of this flange, and fitting accurately in apposition with it when closed, is a flat metal plate, which is hinged to a wire rod immediately behind the shallow end of the flange, and with a small counterbalancing weight just sufficiently heavy to keep it comfortably apposed to the flange when at rest.

" The opening in the upper plate is guarded by a few crossed wires to prevent birds, lizards, etc., from falling unwillingly through the trap-door into the water receptacles.

" The whole apparatus is galvanized *en bloc* and so rendered rust proof. It is fixed by screws through its upper surface to the inlet in the top of the water-tank or cask, and receives the rainwater coming through the down pipe.

" While at rest it remains completely closed by the counter-balancing weight and prevents the access of mosquitoes to the enclosed water. With water falling on it the trap swings open to allow a passage, and automatically closes when the fall ceases. . . .

" The apparatus is to be obtained from Messrs. Fredk. Braby and Co., Ltd., Galvanized Iron and Tank Manufacturers, 110, Cannon Street, E.C.4, at the following charges, which in each case include packing and delivering f.o.b. London: One only, 14s.; one dozen, 8s. each; one gross, 5s. each." \*

**ASSAM. Annual Public Health Report of the Province of Assam for the Year 1923.** [MURISON (T. D.), Offg. Director of Public Health.] pp. ii+36+3. 1924. Shillong: Printed at the Assam Govt. Press. [Price 12 annas. 1s. 6d.]

" The recorded deaths from kala-azar in 1923 were 1,839 more than that recorded in 1922 and higher than in any year since 1905. It is noticeable that the increase has been shared by all districts without exception. In keeping with the increased mortality the number of cases of kala-azar [35,071] treated in the special dispensaries run by the Public Health Department and in the Medical Department and Local Board dispensaries, considerably increased. The proportion of deaths to the number of cases treated in 1920 was 38·8 per cent., whereas in 1923 the rate was only 11·7 per cent. This is a very remarkable improvement on the conditions which prevailed in 1920 and before."

**LEAGUE OF NATIONS. The Prevalence of Epidemic Disease and Port Health Organisation and Procedure in the Far East. Report presented to the Health Committee of the League of Nations by F. Norman WHITE. (C.H. 130.)—179 pp. With 1 folding map. 1923. Geneva: Publication Department of League of Nations.**

The League of Nations having decided that it was desirable to study the conditions of the spread of infectious diseases in ports in the Far East, a small committee of experts was appointed to visit the ports of India and of the Far East to investigate the arrangements made

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\* Dr. HORN writes that he has at the Colonial Office a specimen of the apparatus, which could be inspected by anyone interested in the matter.

for the prevention of communicable disease, and Dr. F. Norman White was the sole member of this committee, and he is responsible for the report which was published in 1923. Naturally the document is of considerable length, as it gives a detailed account of the procedure and conditions in a large number of ports. Those who are connected with port sanitation work should obtain copies, as the report contains a fund of information which could not be obtained elsewhere. The part with which we are most concerned is that in which an account is given of the communicable diseases that are rife in the tropics; by far the most important of these is plague. Under this head will be found a most admirable review of the whole plague situation in the East, dealing with the Manchurian outbreaks, the epidemics in Dutch East Indies, and, of course, those in India. It is certainly the best review within a short compass that has ever been produced on this subject. Naturally the main facts, or some portion of them, are known to most of our readers and need not be repeated here. The following points, however, we consider are new and may be given in the author's own words:—

*Symbiosis in Causation of Pneumonic Plague Epidemics.*

"A prolonged and careful study of all the available epidemiological data, only a fraction of which has been referred to here, has driven the writer to the conclusion that the plague bacillus *alone* does not, and cannot, cause widespread epidemics of pneumonic plague. It seems more than probable that there is an additional organism at work—in other words, the plague bacillus in symbiosis with another organism is responsible for epidemic manifestations of pneumonic plague, which is a disease *sui generis*. The confirmation, or refutation, of this theory must pend further laboratory investigation, opportunities for which may be afforded by the next outbreak of primary pneumonic plague. If the existence of this hypothetical organism be postulated—an organism non-pathogenic for rodents—all, or nearly all, regarding the history and epidemiology of plague that is obscure in the light of present knowledge becomes clear. In the meantime there is quite sufficient epidemiological fact to guide the framing of rules and regulations.

"It is realised that the enunciation of a somewhat revolutionary theory in a report of this nature is open to criticism, more especially as space only admits of a very incomplete discussion of a very large question. *Whether or no the theory be accepted, the few facts that are put forward in this report afford ample justification for regarding bubonic plague and pneumonic plague as two separate and distinct diseases from the point of view of sanitary conventions and prophylactic procedure.* If this be done, plague prevention can be rendered less irksome and more effective than it is at present; it will be possible to concentrate on probabilities and essentials and to neglect mere possibilities.

"It is not denied that the direct transference of infection from the sick suffering from bubonic plague to the healthy is possible *in exceptional circumstances*. The very occasional infection of the attendant on the sick must sometimes be explained in this way. Some of the small circumscribed outbreaks of pneumonic plague that have arisen during the course of bubonic plague epidemics are apparently susceptible of no other explanation, but such limited outbreaks appear to have been vastly different from epidemic pneumonic plague of more northern climates. Some of them have been circumscribed in spite of the fact that no strict measures of segregation, or any measures at all, have been applied.

"It is not contended that the plague bacillus is unessential to the development of pneumonic plague epidemics. On the contrary, it is certain that the plague bacillus is chiefly responsible for the 100 per cent. case mortality rate of such epidemics. It appears to play a rôle similar to that played by the pneumococcus during the pandemic of influenza in British India. The analogy is apposite. In certain circumstances infection with the pneumococcus is acquired by close contact with pneumonia patients. Epidemics of pneumococcus pneumonia may occur, but the pneumococcus alone is incapable of producing widespread pandemics of the influenzal type."

"Rat-Free" Grain Storage.

" . . . Rats cannot live on dry grain alone ; water is also essential. If deprived of water, *Rattus rattus* may develop those cannibalistic tendencies, of which too much has been made in certain contributions to plague literature, if they cannot escape. A very small quantity of water will supply a rat's needs—the moisture on grass or green vegetables will suffice. The first essential in the construction of a rat-free store is therefore to exclude water. The roof must be rain-proof ; all openings must be protected from driving rain by roof projections, and nothing other than dry grain must be kept in the store.

"*Rattus rattus* cannot jump as high as three feet in a vertical direction, and though an admirable climber, it cannot circumvent a horizontal projection, smooth on the under-side, if such projection be nine inches in width.

"No part of a building used as a large grain-store should in any circumstances be used for human habitation.

"In these three short paragraphs are compressed all the desiderata necessary for the construction of a rat-free store. Such a store would be built on a plinth three feet high, constructed of material impermeable to a rat's burrowing. This plinth would be surmounted on all sides by a projecting ledge nine inches wide, smooth on the under-surface. On the side containing the entrance this ledge could conveniently be expanded to two and a half or three feet to facilitate the transference of sacks of grain from or to railway wagon, bullock cart, lorry or the coolie's back. No steps or similar easy means of ingress or egress would be permitted. The roof would be raintight and project sufficiently to protect the ledge and platform from driving rain. No trees would overhang the store. Into such a store rats would be introduced from time to time. They would have to leave in search of water and they would find their return impossible.

"These ideas have been propounded by the writer on many occasions ; such godowns have been constructed. The subject is summarised once more in this place because of the conviction that the suggestions will prove of use and interest to many in the East who are grappling with a health problem of international importance, as well as one of great local concern. . . .

"Notwithstanding all these circumstances [presence and persistence of plague ; large grain export] Karachi stands alone among the large ports of India inasmuch as, to the best of the writer's belief, it has never been accused of exporting plague infection overseas, though complaints regarding other ports, *e.g.*, Bombay, Rangoon, and Calcutta, have not been infrequent in the past. The explanation of this anomalous state of affairs is simple. It is the local trade custom to ship all wheat from Karachi in new gunny bags. The wheat is emptied out of the

bags in which it has made its journey from the Punjab on to concrete platforms, where one can at times see huge mounds of grain. The wheat is there rebagged and placed immediately on board ship. This procedure was not prompted in any way by considerations of public health, but it would be difficult to devise more simple or more effective anti-plague measures. Unfortunately climatic conditions and questions of space make it impossible to introduce anything of the kind in other important plague-infected Eastern ports."

### Conclusions.

" 1. Bubonic plague is, all things considered, the most important ship-borne disease in the Orient.

" 2. Bubonic plague is essentially a disease of rats, and the human case is, for all practical purposes, not infectious.

" 3. There is abundant epidemiological information, based on a quarter of a century's experience, to justify the consideration of bubonic plague and pneumonic plague as two entirely separate and distinct epidemic diseases.

" 4. It is extremely doubtful whether the plague bacillus *alone* can give rise to pneumonic plague epidemics.

" 5. Epidemiological facts indicate the probability that pneumonic plague epidemics are caused by the plague bacillus in symbiosis with another organism.

" 6. It is probable that this 'hypothetical' organism will be found to be non-pathogenic for rodents.

" 7. Bubonic plague is invariably spread from port to port by means of 'rat-favoured' merchandise.

" 8. The fact that one is able to incriminate such merchandise in the transference of plague infection from place to place implies the relative failure of the human being and his personal effects as vectors of infection.

" 9. All anti-plague regulations and conventions should be framed with due regard to these facts.

" 10. Of all forms of rat-favoured merchandise, grain is of chief importance with regard to the facilities given for the transference of plague infection.

" 11. The control of the grain trade and the proper storage of grain are almost synonymous with efficient plague preventive measures.

" 12. If the association between rats and grain and other rat-favoured merchandise could be broken in the ports of the East, plague would cease to be a ship-borne disease.

" 13. If due consideration be given to the attributes of the rat, it is possible to erect storehouses that can be kept automatically rat-free. Many 'rat-proof' stores now in existence harbour a large rat population.

" 14. Much more might be done than is done at present to control the rat population of such rat-proof stores; certain suggestions are contained in the note.

" 15. The present condition of grain storage in many ports of the East is reprehensible and dangerous.

" 16. Pending improvement in such matters, fumigation at periodic and frequent intervals of ships trading in the East will continue to be a matter of extreme importance.

" 17. Further work is required to devise more satisfactory methods of fumigation than those at present in use.

" 18. The disinfection before shipment of rat-favoured merchandise from plague-infected localities demands much more consideration than it receives. Such measures should, wherever possible, be taken at the port of departure.

" 19. The rat-infestation of lighters, barges, etc., employed in Oriental ports is sometimes excessive. Cases of plague among the floating population of certain ports occur from time to time. The periodic fumigation of lighters, junks, barges, etc., employed in all Oriental ports is an important matter that rarely receives the attention it deserves.

" 20. The history of the spread of plague in the East indicates that attention paid to the usual channels of infection could secure almost absolute immunity from plague, and that without vexatious restrictions to the free flow of commerce.

" 21. The tendency of the disease to die out in large areas of the East, unless reinforced by repeated introduction of infection, accentuates the importance of preventing such re-infection.

" 22. From the epidemiological viewpoint, human bubonic plague cases are merely an index of a co-existent rat epizootic.

" 23. This index is inadequate, or may fail altogether, in circumstances dependent upon either :

- (1) the nature of the rat-infestation of the port, or
- (2) the species of fleas that infest the rats.

" 24. Such facts emphasize the absolute necessity for a systematic and thorough routine examination of rats in all Oriental ports.

" 25. British India is by far the most important reservoir of plague infection in the East. Java comes second. The prevalence of the disease in British India is decreasing noticeably in those provinces that have suffered most.

" 26. The experiences of Manila, Formosa and Shanghai, which have been plague-free for many years, promise a successful issue to a serious attempt to eradicate plague infection from many other Oriental ports at present infected.

" 27. This task might not be insuperably difficult, except perhaps in the case of Bombay, which, of all large ports in the East, possesses conditions most favourable to plague.

" 28. The gradual extinction of foci of plague would, by diminishing sources of possible re-infection, accelerate the natural tendencies to 'die out' which characterize plague on either side of the Bay of Bengal and further east.

" 29. In most Oriental towns anti-plague measures are unsuccessful, largely on account of the antagonism of the population to such measures.

"30. The disinfection of houses and their contents is the most commonly practised of all anti-plague measures; it excites great antagonism and, as carried out, is of extremely doubtful utility.

"31. Suggestions are made regarding a new orientation of plague policy in many Oriental towns."

JORGE (Ricardo). **Sur la peste pneumonique à propos de l'épidémie d'Alcochète.**—*Bull. Office Internat. d'Hyg. Publique.* 1923. Nov. Vol. 15. No. 11. pp. 1431-1439. With 1 fig. [1 ref.]

The writer gives an interesting account of a small but very violent outbreak of pneumonic plague in a small town called Alcochète, 25 kilometres from Lisbon, with a population of about 3,000. The first case was infected in Lisbon, arrived home feeling ill, and passed the disease on to his father, brother and fiancée. The symptoms were those always associated with the disease. The second group of cases originated with the sick nurse who attended the infected family, and she passed on the disease to four other people. There were eight deaths in all, spread over a period of about a month. Previous outbreaks in Lisbon have shown that amongst 112 cases in 1920 there were only four pneumonic.

OTTEN (L.). **The Plague in Java (1911-1923).**—*Meded. Burgerlijk. Geneesk. Dienst. in Nederl.-Indië.* 1924. Pt. 2. pp. 115-248. With 2 maps, 6 charts & 18 figs. [10 refs.]

The writer gives a very long and detailed account of the onset and extent of the epidemic of plague in Java. In several of the Sanitation Supplements the subject of plague measures, particularly rendering native houses free from rats, has been treated. The report under review deals with the results obtained from this and other measures. It is not very cheerful reading, but it explains in detail the cause of the non-success of very carefully organized campaigns that have been attempted in Java. Investigation into the rat and rat-flea fauna gave the following results.

"The most common species of rats found in Java are:

"(1). *Mus rattus*, sub-species: *griseiventer* BONHOTE, the common domestic rat;

"(2). *Mus rattus* sub-species: *diardii* JENTINK, the field rat;

"(3). *Mus rattus* sub-species: *rufescens* BONHOTE, the tree rat;

"(4). *Mus concolor* BLYTH, the so-called small domestic rat;

"(5). *Mus norvegicus* ERXL.=*Mus decumanus*, the sewer rat.

"Besides these species, which partly live in houses and partly in more or less close contact with houses and compounds, some other kinds deserve to be mentioned, which are less frequently or even seldom met with in dwellings. These kinds are:—

"(6). *Mus jerdoni* BLYTH, a coconut rat;

"(7). *Chiropodomys gliroides* BLYTH, a graceful little bamboo rat;

"(8). *Nesokia setifera* HORSEF.;

and moreover *Mus musculus*, the ordinary mouse, and different kinds of *Crocidura*, among which *coerulea* (*murina*), the so-called shrew, a mole-like animal, belonging to the family of the *Insectivora*.



"The generally occurring rat flea is *Xenopsylla cheopis*, the common tropical rat flea; a second species of flea being found in mountain territory, viz.: the *Pygiopsylla ahalae* . . . . .

"In Java, where a lower temperature and a greater humidity are the cause of the far less obvious character of the 'seasonal prevalence,' a longer duration of infectiousness than the 15 days observed at Bombay might be expected from the outset. SWELLENGREBEL, moreover, in a number of experimental transmissions at an average temperature and a relative humidity of 23°C. resp. 75-80 per cent. was able to establish the infectiousness of *X. cheopis* up to 28 days. At Soerabaja, with an average temperature of 28.5°C. and a relative humidity of 64-67 per cent. he found the maximum period to be 19 days. At Kediri, HOESEN, at a somewhat lower temperature (25-26°C.) and about the same degree of humidity, observed a duration of infectiousness of 29-33 days; while VAN STEENIS at Solo in a temperature similar to that at Soerabaja and a higher relative humidity (75 per cent.) found the maximum to be 21 days.

"At Malang as well as at Kediri the maximum of 28 and 33 days was reached during the dry season; although the temperature within certain limits of humidity has evidently a preponderating influence on the period of infectiousness, we might presume that a higher degree of humidity could only prove favourable to this period. In three transmissions, made at Malang during the rainy season with three different kinds of rats (*M.r. griseiventer*, *M.r. diardii* and *M. concolor*), the breeding cages actually proved infectious during a longer period, these not being exhausted before 36, 37 and 43 days. The record of 43 days (more than six weeks) was reached in a cage with *M. concolor* as indicator, but from the fact that the domestic rat and the field rat were still liable to infection after five weeks, we may conclude the susceptibility of these three species to differ little, as is also evident from direct infection by inoculation."

As we have reported before, *M.r. griseiventer* is pre-eminently a house rat, living in the thatch and in the bamboo fabric; it often gnaws through a bamboo and makes its nest in the hollow internode.

*Rattus concolor* is a very active rat and a great traveller. It is a field rat in the hilly districts of the Island. It will live in houses equally well provided *M.r. griseiventer* has either been driven out by anti-plague measure or killed off by plague itself.

"The above investigations not only confirmed the supposition that *M. concolor* is met with out of doors, but moreover that in a plague-free area it occurs exclusively as an outdoor rat, the rat population indoors consisting of one species only, viz., *M.r. griseiventer*, also here limited to the house and its compound. *M. concolor* is consequently not driven out by the domestic rat as being smaller, but is not admitted to the house. As long as the population of the domestic rat remains intact, it manages to prevent the invasion of *M. concolor*, notwithstanding the strong inclination of the latter to it as clearly demonstrated by its presence in *pondoks* in the fields, sometimes close to the *desa*. Not before the ranks of the domestic rat have been depleted by plague is the barrier relaxed and begins the invasion of *M. concolor*; then only, and not before, is *M. concolor* able to enter its second stage of domestic rat."

*Mus decumanus*, the sewer rat, is practically confined to ports on the Coast, where it has been imported by ships and has little epidemiological significance in Java.

As regards fleas, *X. cheopis* is the common flea on the domestic rat. It does not exist, however, on *M. concolor*, except when this rodent has invaded the house.

"*Pygiopsylla ahalae* is much less common in Java than *X. cheopis*, which is due to the fact that it needs a lower temperature and, specially, a higher degree of humidity for its development. Consequently it never occurs in the plains; in fact, it is not found at a lower level than 400-450 M., its optimum being found at a height of 800 M. and more. . . .

"*X. cheopis*, being proof against a high temperature and a low degree of humidity, but extremely susceptible to the direct influence of moisture, is the ubiquitously distributed, obligatory indoor flea, whose conditions of life and development are closely bound to the house and compound; only in special circumstances does this species occur in the fields as a full-grown insect, rapidly disappearing, however, when the rains begin to fall.

"*P. ahalae*, less susceptible to moisture but not proof against a high temperature and a low degree of humidity, is an outdoor flea, limited in its distribution to mountain country. Its vital conditions are not absolutely bound to fields and woods, but may be present also indoors, especially at a greater height, where the species is often met with as an optional indoor flea."

On the subject of plague measures there is very much of interest in this part of the report. At one time the baggage and hand luggage of 56,000 natives was searched for ectoparasites by means of sulphide of carbon, with the following results. "Lice, bugs and human fleas (*Ped. hominis* 67 per cent., *C. rotundatus* 24 per cent., *P. irritans* 7 per cent.) predominated; only three rat fleas, i.e., two *X. cheopis* and one *P. ahalae*, were found." Hence it is obvious that human beings do not as a rule carry plague fleas in their baggage, at any rate in Java.

A description of the importance of the housing conditions follows. Its improvement was, of course, designed to render the house unsuitable for the formation of nests. This, as already pointed out, means the substitution of wood for bamboos to some extent and of tiles for vegetable thatch for the roofs. Good appears to result from this work; but unfortunately plague recurred. The explanation of this is given thus:

"Although the favourable results of housing improvement are undeniable, this is not a means of suppressing an epidemic; in connection with the unfavourable housing conditions in Java it is impossible to execute improvements so quickly that they obtain repressive value."

"The secondary invasion of *M. concolor* is an unwelcome complication, but less serious in its consequences in connection with the reciprocal action between the domestic rat and *M. concolor*. The latter may penetrate into the dwellings at first in such numbers that the depletion of the population of domestic rats is partly neutralized, but it cannot remain there, being driven back to the fields after an increase in the number of domestic rats has taken place, so that danger from this quarter is of a temporary nature only."

As regards evacuation the author does not appear to have obtained anything like as good results as were obtained in India; and the reason would appear to be that a comparatively short evacuation in India until the "off season" has arrived is sufficient to save many lives. In Java it would appear that the off season is nothing like as well marked as it is in many parts of India, and that the disease not infrequently recurs when the people return to the villages. Fumigation of villages

with  $\text{SO}_2$  has been tried very energetically, sometimes accompanied with evacuation and sometimes not. It may be looked upon as only partially successful. The writer says that it is extremely difficult to be quite sure how much is really accomplished by the measures and how much is due to the natural decline of the disease.

On the subject of inoculations he says that it is extremely difficult to get a figure which represents the amount of protection afforded by the operation. That it is useful there can be no doubt.

In conclusion the writer argues that if tiles are substituted for thatch and if horizontal beams of wood are used instead of bamboos this will probably give as much protection as a more elaborate method. The difficulties at present are that the supply of tiles is deficient in Java, and the industry would require a good deal of stimulation. The people do not object to this measure, and he considers that organization might be started to further it.

MOORE (J. I.). **Co-Operation of Central and Local Authorities in the Control of Plague.**—*Health*. Melbourne. 1924. Mar. Vol. 2. No. 2. pp. 40-41.

The recent visitation of plague in Queensland lasted about seven months amongst human beings and 14 in rodents before it was eradicated. In the previous outbreak plague continued for a period of 9 years. The writer accounts for the cessation by the hearty co-operation between the central and local authorities. Anti-plague measures took the form of a vigorous rat campaign, and in the year ending August, 1922, 128,000 rats were destroyed. A very large amount of rat-proofing of wharf frontages and of premises where food was stored was also accomplished.

PROCEEDINGS OF THE TRANSVAAL MINE MEDICAL OFFICERS' ASSOCIATION. 1924. Apr. Vol. 3. No. 12. pp. 4-17.—**Conference on Precautions to be taken in Prevention of Plague on the Mines of the Witwatersrand.**

These proceedings are of great interest to all sanitarians. They deal largely with rat catching and anti-plague measures in the compounds of mines. Dr. HAYDON, who took part in the discussion, gives some extremely valuable information concerning the habits of wild rodents in South Africa and methods used by himself and his staff in investigating the plague problem and in combating it. A verbatim account of the discussion is given and greatly adds to the interest of the publication.

The President, Dr. DONALDSON, remarks that the cage trap gives very much better results in the mine than on the surface; here the break-back trap is by far the most successful. As a way of protecting food and rations against rats in one mine, ventilation pipes were placed vertically with the ends bedded in cement; when this set they had miniature silos, 8 ft. long by 2 ft. diameter; these formed rat-proof stores.

The exhaust gas from motor cars or motor bicycles blown into rat holes is a very useful method of driving them out or killing them if they choose to remain. Rock dumps in the neighbourhood of mines in the Rand have given very great trouble, as they form suitable harbourages for rats. Bird-lime on planks was found useless.

Various other methods known to everybody are described. The sack method may, however, be new: "One . . . fills a sack partly with meat, mealie meal and bran, and hangs it up with the top flush with the top of the wall of a room. A looped string is tied round the neck of the sack. The rat comes along and hurries into the sack, the native pulls the string and clubs the rat and starts again. This is primitive, but effectual."

Apparently cats have answered extremely well in the Rand. Several speakers have large numbers of cats, 100 to 150 in one case, and they are the best solution of the rat problem. Cats should receive food regularly, namely, a little milk and a small piece of meat daily, but should not be overfed. Under this treatment they will catch rats better than if they are starved.

Dr. Haydon commented:—

"The reason why the gerbille is the most dangerous is because he is the most numerous, breeds most rapidly, and has an extraordinary habit of visiting; he is a gossip. Our rodent inspector, Mr. Powell, has taken an enormous amount of trouble in searching out the habits of gerbilles. Every night they may visit every other gerbille burrow within a thousand yards. Water rats do not visit each other's burrows. This area here, coloured brown, in the Eastern Karroo (indicating on map) is just as thickly populated with water rats as the blue and yellow areas are with gerbilles, but they do not visit. The water rats take plague occasionally, but where gerbille areas and water rat areas overlap the disease has not appreciably spread amongst the water rats.

"The gerbille's habits are such that he does not come into houses, barns, or mealie stacks, and cannot thrive and multiply except in light, sandy soil with sweet grass and bulbs.

"The intermediate carrier of infection from the gerbille to man is the multimammate mouse. He lives in the veld to some extent, but he also comes into people's houses and backyards; he picks up the fleas from the dead gerbilles. He is very much like the ordinary house mouse, only slightly bigger. (Indicating stuffed specimen.) Those are the two chief culprits . . . . .

"Whenever our inspectors have found in the Free State, or any other area where human or rodent plague has occurred, in any stack of maize (and at some of the sidings there were 30,000 or 40,000 bags piled up awaiting transport), any evidence of rodent mortality, such stack was immediately quarantined. No maize has been removed from any infected stack until it was put through an elevator. The elevators came in the nick of time. The actual treatment of such maize was as follows: Before it could be handled at all it was necessary to spray it to kill fleas. That was done with formalin solution 2 per cent., which removed the immediate danger. After spraying it could be safely handled, trucked and sent to an elevator. The elevator treatment finally removes all danger of infection. I do not know whether everybody is familiar with the elevator system. The grain is put through various grades of sieves, and meanwhile a forced draught removes all dust, fleas, weevils, etc., which come down a special chute, are received in bags damped with disinfectant, and then removed to a furnace. It may be partly luck that no infected maize has so far reached the ports or the big towns, but I am quite certain that fact is largely due to the care of the railway department, acting under advice and supervision of health officials. The danger is not over. Plague will recur at intervals for many years . . . . .

"The way I would suggest for domestic rodents in rock dumps would be the baiting system that Mr. Powell has found so useful. It is absolutely impossible to gas in the case of rock dumps; the interstices, the inlets and exits are too numerous, but the baiting method as advocated by our department has been found fairly successful in similar circumstances. We make special places with timbering, boxes, packing cases, lumber and what not, which rats can get into and which dogs, cats and children cannot get, and the rats are left quite undisturbed. But the baiting places are so arranged that those responsible can get at them every day and bait the rats. We put down new bread and new milk fresh every night; what is left every morning is removed or burnt. They are baited for a matter of ten or fourteen days, often longer, until one has the entire confidence of the rats—until they know they can come to two or three safe places. By spreading a little flour on the ground one can find out by observation about how many rats come to feed. One may go on baiting for two or three weeks. When one has the complete confidence of the rats, then white arsenic is added to the bread and milk and well mixed. In one night at the south arm at Capetown, our rodent inspector, Powell, killed a matter of between 400 and 500; but the method has to be carefully watched. It is impossible to be done by a native; he has not the intelligence. It is a case of matching a man's brains against a rat's brains, and a rat's brains are pretty good."

## WATER.

HOUSTON (Alexander). **The Purification of Water Supplies.**—*Surveyor & Municipal & County Engineer*. 1924. July. 11. Vol. 66. No. 1695. pp. 27-28.

"Recently Dr. Thresh has been carrying out some highly successful experiments, and he has courteously allowed me to give you a preliminary account of the results obtained.

"The problem was to soften, sterilise, and render physically attractive impure river water.

"Enough lime (in the form of milk of lime) was added to the river water to combine with the dissolved carbonic acid and bicarbonates, and leave an excess of from 1.5 to 2.5 parts of CaO per 100,000. The amount of lime necessarily varied considerably, but may be stated as approximately from 2½ lb. to 3½ lb., of CaO per 1,000 gallons.

"The lime-treated water flowed through a tank with baffling walls, holding 24 hours' flow when working at the rate of 1,000 gallons per hour. When the excess of CaO was 0.5 (or over) the outlet water contained no *B. coli* in 100 c.c., although the inlet water frequently contained this microbe in 0.01 c.c.

"After leaving the liming tank the water filtered through sand at the rate of 56 gallons per sq. foot per hour, and the final filtrate was transparent, reasonably free from brown colouration, tasteless, and contained no *B. coli* in 100 c.c.

"For removing the slight causticity of the limed water and improving the filtration results, small doses of sulphate of alumina (about 1 to 2 parts per 100,000) were added to the water as it left the lime tank.

" Other substances were also tried—*e.g.*, carbonic acid gas generated from coke, nitric cake solution, and sodium bicarbonate—and apparently the  $\text{CO}_2$  is giving the best results.

" The following results for April and May may be regarded as fair average comparisons for the best and worst months of the quality of the river water being treated, the limed water, and the final filtrate :—

Average results for April, 1924, per 100,000.

	Raw river water.	Limed water.	Filtered and fully treated water.	Per cent. reduction.
Turbidity ... ..	24	—	0	—
Colour ... ..	23	10.5	5.5	76
Free lime at end of 24 hours	—	2.7	0.2	—
		$\text{Ca}_2\text{HO}$		
Free $\text{CO}_2$ ... ..	0.6	0	0.0	—
$\text{CaCO}_3$ ... ..	22.5	4.8	3.4	—
Total hardness ... ..	28.7	16.0	12.5	56
Chlorine ..... ..	4.9	—	—	—
Oxygen absorbed ... ..	0.215	0.135	0.10	54
Bacteria, gel. per cc. ... ..	8,400	9.3	6.4	99.9
Bacteria, agar per cc. ... ..	1,200	7.1	1.6	99.9
<i>B. coli</i> in from ... ..	0.01 to 1.0 cc.	—100 cc.	—100 cc.	From 1,000 to 100,000 times improved.

Average results for May, 1923, per 100,000.

	Raw river water.	Limed water.	Filtered and fully treated water.	Per cent. reduction.
Turbidity ... ..	114	—	0	—
Colour ... ..	29	16.6	8.5	71
Excess lime at end of 24 hours ... ..	—	2.25	0.35	—
$\text{CO}_2$ ... ..	0.64	—	—	—
$\text{CaCO}_3$ ... ..	23.1	4.5	2.4	—
Total hardness ... ..	27.6	15	10.5	62
Oxygen absorbed ... ..	0.43	0.225	0.15	65
Chlorine ... ..	3.9	—	—	—
Bacteria, gel. per cc. ... ..	7,230	225	49	99.3
Bacteria, agar per cc. ... ..	2,270	44	9	99.6
<i>B. coli</i> in from ... ..	0.1 to 1.0 cc.	—100 cc.	—100 cc.	At least from 1,000 to 10,000 times.

" It will be understood that the conditions of experiment were constantly varying, partly due to natural causes and partly with the object of finding out the best working conditions, but the above figures may be taken as representing approximately what the process is capable of achieving.

" It will be noticed that for April the turbidity was practically entirely removed, the colour was reduced 76 per cent., the hardness 56 per cent., the oxidisable matter 54 per cent., the bacteria 99.9 per cent., and the improvement as regards *B. coli* was at least from 1,000 to 100,000 times.

" For May the turbidity was practically entirely removed, the colour was reduced 70 per cent., the hardness 62 per cent., the oxidisable

matter 65 per cent., the bacteria 99 per cent., and the improvement as regards *B. coli* at least from 1,000 to 10,000.

"These results, obtained quite independently, appear to me to fully justify the conclusions which I ventured to put forward some years ago as regards the value of the excess lime method in well-selected cases . . . . .

"In London we have used, and are using, chlorination with great success.

"The following facts relating to our eight years' experience of chlorinating Thames river water may be of interest:—

Average dose .. .. .	1 in 2·3 millions.
Highest dose .. .. .	1 in 1 million (2 in 1 million for 18 hours).
Lowest dose .. .. .	1 in 4 millions.
Longest run without a break.. .. .	368 days (exclusive of stoppages due to drought)
Average number of days of treatment per year (7 years' average, 1917–24).. .. .	321, Hampton. 311, Staines.
Highest monthly temperature of river water when treatment was in operation the whole month .. .. .	20·1 deg. C., July, 1923.
Lowest ditto .. .. .	4·1 deg. C., Feb., 1924.
Worst month as regards quality of river water (as judged by colour) when treatment was in operation the whole month .. .. .	Nov., 1923, Colour 111.
Best ditto .. .. .	Aug., 1919 } Oct., 1919 } Colour 36. May, 1920 }
Longest period of contact before reaching filter beds	West Middlesex works, about 14 days.
Shortest period of contact before reaching filter beds	Kempton Park works, about 4 hours.
Highest calculated saving .. .. .	£21,134 per annum.
Lowest calculated saving .. .. .	£10,503 per annum.
Average calculated saving (on 7 years, 1917–24) .. .. .	£15,923.
Gross calculated saving .. .. .	£119,639.
Total volume of water treated .. .. .	184,609·3 million gallons.
Gross amount of chloride of lime (bleaching powder) used .. .. .	1,075·33 tons.
Average percentage of available chlorine extracted from chloride of lime .. .. .	33·36.
Average bacteriological result, percentage of samples, of chlorinated river water containing no typical <i>B. coli</i> in 10 c.c. (the raw river water before chlorination during the same period contained typical <i>B. coli</i> in 1 c.c. (not 10 c.c.) in 83·2 per cent. of the samples examined .. .. .	78 per cent.
Average percentage reduction in the "acres of filter beds cleaned" at the works concerned, as compared with 1914–15 (year 523 as compared with 747, previous to chlorination) .. .. .	30 per cent. reduction.

"At Highfield, on the New River, we use liquid chlorine, but usually only during the flood months of the year. Owing to the difficulty of treating the New River without giving rise to a taste, permanganate of potassium is often used as well, the dose commonly employed being

2 lb. per million gallons. The effect of the treatment is practically to convert winter into summer, so far as the bacteriological condition of the finished product is concerned."

BANERJI (Nani Lal). **The Influence of Hydrogen Ion Concentration on the Dose of Alum and the Mechanism of the Action of Alum in the Clarification of Natural Waters.**—*Indian Jl. Med. Res.* 1924. Jan. Vol. 11. No. 3. pp. 695-718. [9 refs.]

This paper deals with a subject of vital importance to Calcutta in particular and to all water engineers and sanitarians in the East. Using Hooghly water during the monsoon, when it is always very highly charged with silt, the whole chemistry of precipitation with alum has been investigated, making use of the Hydrogen Ion concentration as a basis of enquiry. Details of the various experiments need not be given, but the conclusions, which are of great importance, will be found below in the author's own words.

"1. Other factors remaining constant, viz., suspended matter, size of particles, concentration of electrolytes, the optimum dose of alum increases as the pH increases and decreases as the pH decreases.

"2. Total hardness plays an important rôle in regulating the dose.

"3. The mechanism of the action of aluminium sulphate is divided into two portions due to (1) unhydrolysed aluminium sulphate, (2) hydrolysed aluminium sulphate, which again is made up of two components (a) sulphuric acid, (b) aluminium hydroxide. The positive aluminium ion from the unhydrolysed portion is the most potent factor in clarification. Then comes the hydrogen ion from sulphuric acid. The last and the least is  $Al(OH)_3$  sol.

"4. The dose of alum can be decreased by the preliminary addition of such a cheap acid as sulphuric acid.

"This last conclusion is very important from the point of economy in water works in case of slow sand filters. During the monsoon, when the suspended matter in the Hooghly goes very high, as much as 1 ton of aluminio-ferric, worth Rs.150, is used daily by the Calcutta Corporation. In view of the facts revealed by our present investigation, this huge consumption of aluminio-ferric can be much lessened if a smaller quantity of the same is dissolved in acidulated water instead of ordinary water in the dissolving tank. The addition of acid is, however, limited by the pH of the water. If the original pH of the water is not high, we cannot acidify water too much, because it may affect its taste and injure machinery. The dose of alum and acid can be so regulated that the resultant pH may be made such as will not go far from the absolute neutral point=7.0, in which case the taste and machinery will remain unaffected. For a few successive days, the pH of Hooghly water during the monsoon remaining constant, it was possible for us to work out the following dosages:—

5 cc. N/10 $H_2SO_4$ unaffected).	+ 300 cc. turbid water—	Resultant pH=6.1 (litmus paper
0.5 parts of Alum	+ 4.0 cc. N/10 $H_2SO_4$ —	" =6.55
1 part "	+ 3.5 cc. " —	" =6.3
2 " "	+ 2.5 cc. " —	" =6.7
3 " "	+ 1.4 cc. " —	" =7.00

"Values of pH, as will be seen from the above table, are fairly high for our purpose. We find from the above table that as we increase the



dose of alum we can decrease the dose of acid, and *vice versa*. We can safely go as near as pH 5.75, as the laboratory distilled water with  $\text{CO}_2$  dissolved in it which has got the same pH is quite harmless.

"We may mention an interesting fact in regard to the analysis of alum or aluminio-ferric. These are generally prepared from bauxite or clay by the action of sulphuric acid and are apt to contain free sulphuric acid. We know of several instances of rejection of samples by chemists on account of the presence of free sulphuric acid in it. In the light of our research the 'acid alum' may be preferable to 'basic alum.' In this connection we might suggest that it might be profitable to treat the mud from the settling tanks in case of slow sand filters with acidulated water to recover the residual alum. The acidulated water may with advantage be utilized in dissolving a fresh lot of alum in the dissolving tank. A much smaller quantity of alum, however, can now be used, as it has already been supplemented by the alum and acid present in the washed liquor. A saving in the cost of alum can thus be effected."

HAROLD (C. H. H.) & WARD (A. R.). **Report on Experimental Work carried out at the Army School of Hygiene to demonstrate that Chlorine Gas in Association with Ammonia Gas is a more Efficient Sterilizer of Water than Chlorine Gas used alone or Chloros or Bleaching Powder.**—*Jl. Roy. Army Med. Corps.* 1924. June & July. Vol. 42. No. 6, & Vol 43. No. 1. pp. 414-423; 14-23. [4 refs.]

This paper is of very great importance to all responsible for chlorination of water supplies. Anomalous results when dealing with unfiltered supplies have frequently been obtained. The authors deal with the reason for these erratic findings, and also show that if a small trace of free ammonia is added to the water the action of the chlorine is improved. It is unnecessary to give details of the experiments; those interested should obtain the original paper. The conclusions arrived at are given in the authors' own words.

"We are of the opinion that the anomalous results met with in practice are attributable to inhibition, and that the sterilization by chlorine and hypochlorites of waters with a high colloid content, such as may be met with overseas, is unreliable if only an examination for the presence of free chlorine in excess of natural deviation is relied on. Inhibition is induced by broth, excess of organisms, animal and vegetable pollution, and when it occurs an extremely large excess of chlorine is required to effect sterility; and, in fact, a much larger quantity in some instances than is usually employed. For this reason excessive chlorination, with amounts of chlorine up to twelve parts per million, followed by partial or complete dechlorination, as was customary in many parts of France, commends itself to us as a very wise procedure; and this method, which has been already adversely criticised in certain quarters, is undoubtedly based on sound practical experience, and is now supported by scientific experiment.

"In military practice, albuminoid matter is removed or reduced initially by sedimentation or clarification, but recently it has been shown that the clarifying powder used on the regulation water cart does not react with all waters, particularly with soft waters containing

algal growths, and on these occasions the addition of sodium acetate is necessary to ensure coagulation.

"The foregoing experiments indicate that in the control of chemical sterilization chemical analyses are of the greatest value. A high albuminoid figure, especially in conjunction with a relatively low chlorine absorption figure, should attract attention, and the possibility of inhibition must then be considered. When using chlorine gas, sterility should be fairly easily obtained in waters giving a high free and saline ammonia figure, indicating a not too recent nor too distant pollution. Waters containing nitrites in any quantity require a large excess of chlorine and are unsatisfactory to treat.

"The resistance to killing of the different species of excremental organisms in water heavily charged with colloid matter shows considerable variation, and they may apparently be graded in order of susceptibility. As our test organism, we have designedly employed an organism of this group possessing the greatest power of resistance. It must be admitted that when faecally polluted water was used in conjunction with laboratory cultures, the recently passed faecal organisms usually succumbed, whereas, as was expected, our laboratory culture organism (even of agar) proved more resistant. Even assuming that the majority of infective pathogens in moderately pure water can be easily killed by a low concentration of chlorine, the behaviour of the "resistant minority" in waters heavily loaded with colloid matter cannot be foreseen; and as in military operations the immediate consumption of treated water is the rule, it would appear eminently desirable to adopt a process whereby the most resistant species and types of excremental organisms are readily destroyed.

"Strong corroboration of these findings appears in a recent paper by Mansell on the Chlorination of Milk, in which he points out that if cultures of cholera vibrios, *B. typhosus* and *B. dysenteriae* (Flexner) are added to milk, enormous quantities of chlorine are required to produce sterility; and even with such amounts *B. dysenteriae* (Flexner) is not destroyed. In this connexion, Winter Blyth found that in milk the Rideal-Walker coefficient was reduced from 2.2 to 1.

"In regard to the increase in the lethal action of chlorine gas, when ammonization is employed, in Experiment No. 8, using chlorine as bleaching powder solution, sterilization in a 1 in 10,000 pollution is effected by three parts per million of chlorine, and in Experiment No. 16, under the same conditions, but employing gas and ammonization, this is attained by one part per million. In addition, a palatable water is produced (*vide* Experiment No. 19), the phenomenon of inhibition does not present itself, and apparently the natural deviation of the water can be ignored.

"This enhanced action does not appear to be due to alteration in the pH value of the water set up by the chemicals, and, as Rideal points out, ammonia compounds are endowed with special penetrative powers. It appears feasible that the organisms or colloids in intimate contact with them take up ammonia first, and on appearance of chlorine gas, chloramine or other chlorine ammonia group compounds are produced *in situ* and exercise their maximum effect.

"The superiority of chlorine gas over chloros and bleaching powder is brought out by these experiments.

"Experiment No. 15 demonstrates that bleaching powder stands fourth in order of efficiency as a chemical sterilizer of water, and this calls for serious consideration. The difficulty of using chlorine gas

instead of bleaching powder with the regulation water cart should not be insuperable, and a suggestion, which may prove to be the solution, has been forwarded to the War Office.

"It is hoped that this investigation, imperfect in many details, may be of use in assisting in the advance of knowledge in the increasingly important field of chlorination. To many interested in this subject it would appear that the repetition of certain somewhat stereotyped stock chemical equations does not satisfactorily explain the process in all its intricate phases, and that further inquiries would be amply rewarded.

"Finally, by a series of experiments, it has been found that the addition of a quarter to half a part of ammonia per million to water prior to its exposure to chlorine gas increases its lethal action, and subsequent tests against various types of pollution have confirmed this fact. A process of such extreme simplicity, capable of universal application, must appeal to all interested in the use of this chemical and its compounds."

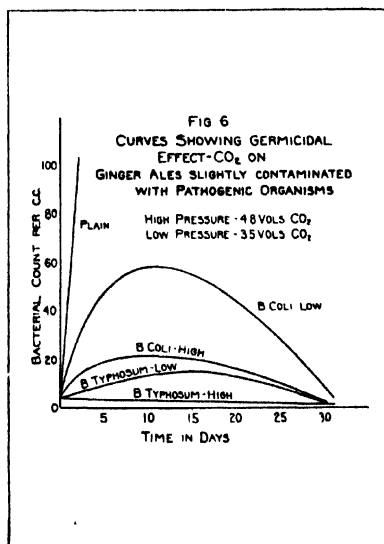
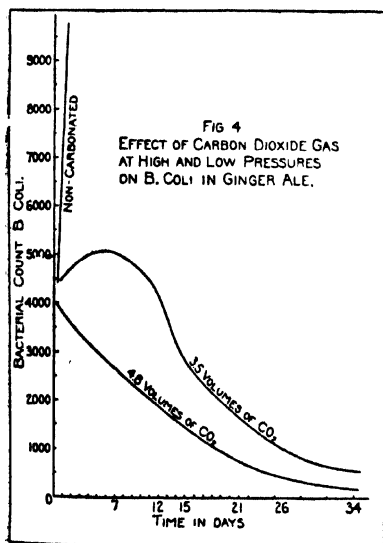
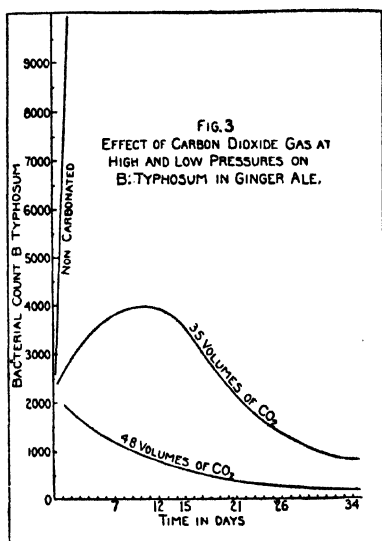
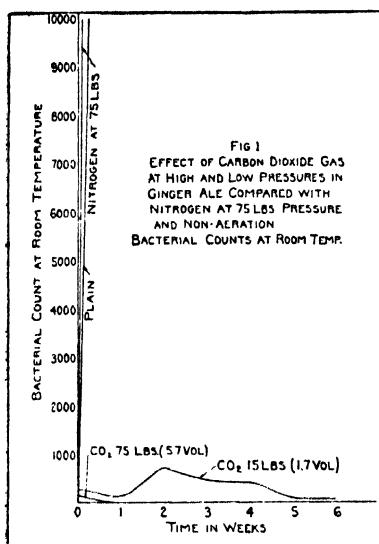
DONALD (J. R.), JONES (C. L.) & MACLEAN (A. R. M.). **The Effect of Carbonation on Bacteria in Beverages.**—*Amer. Jl. Public Health.* 1924. Feb. Vol. 14. No. 2. pp. 122-128. With 6 charts. [28 refs.]

A description of experiments on the effect of placing faecal and pathogenic bacteria in ordinary ginger ale treated with carbon dioxide. This subject is of much importance in tropical countries where the consumption of mineral waters is great. An elaborate series of experiments was carried out. Ordinary bacteria and *Bacillus typhosus* were added to ginger ale and the bottles treated with nitrogen under pressure, and with carbon dioxide at 15 lbs. and at 75 lbs. As is now generally known, the effect of CO<sub>2</sub> on these fluids is to sterilize them slowly. The results obtained confirm those already published and also demonstrate that nitrogen under pressure has no influence whatever on the action of bacteria, the rate of increase being similar in the control bottle. The experimental results are best given in the form of graphs. [Figs. 57-60.]

## FOOD.

DEEKS (W. E.). **The Use of Sweetened Condensed, Evaporated and Powdered Milks for feeding Infants in the Tropics.**—*Amer. Jl. Trop. Med.* 1924. Mar. Vol. 4. No. 2. pp. 113-130.

The writer is the Principal Medical Officer of the United Fruit Co. in America, under whose control are a very large number of American officers. His experience of feeding of infants in the tropics is very extensive. He discusses the relative merits of human, cows', goats' and asses' milk, and gives the analysis of each. He then deals with the prepared milks and gives in tabular form the correct dilution and



Figs. 57-60.—Comparison of effect of carbonation and non-carbonation on bacteria in an ordinary ginger ale at room temperature.

[Reproduced from the *American Journal of Public Health.*]

method of use of (a) sweetened condensed milk, (b) evaporated milk with sugar added, and (c) milk powder known to the trade as "klim." The instructions for use of this are given in the table below.

Age of infant.	Daily amount necessary.	Milk powder (klim).	Cane-sugar, milk-sugar, or dextri-maltose.	Water (sufficient to make).	Amount of each feeding.	Interval of feeding.	Number of feedings daily.
	ounces.	tea-spoon-fuls.	tea-spoon-fuls.	ounces.	ounces.	hours.	
1 day ...	1-4	—	—	1-4	$\frac{1}{2}$ - $\frac{1}{2}$	2-4	4-8
2 " ...	6	2	2 $\frac{1}{2}$	6	$\frac{1}{2}$ -1	2	6-8
3 " ...	10	4	4	10	$\frac{1}{2}$ -1	2	8-10
4 " ...	11	6	4	11	1-1 $\frac{1}{2}$	2	10
5 " ...	13	8	5	13	1-1 $\frac{1}{2}$	2	10
6 " ...	14	10	5	14	1 $\frac{1}{2}$	2	8-10
7 " ...	15	14	5	15	1 $\frac{1}{2}$ -2	2	8
1-4 weeks ...	15-25	4-7	5-7	15-25	2-3 $\frac{1}{2}$	2 $\frac{1}{2}$	8
1-3 months	25-35	7-10	7-10	25-35	4-5	2 $\frac{1}{2}$	6-7
3-6 " ...	40	11-44	12-14	40-50	6-8	3	6
		[? 14]					
6-12 " ...	50	14	14	50	8-10	3-4	5-6

This powder will keep in a warm country for 3 or 4 months. The manufacturers claim that the vitamins are not destroyed in the process of manufacture. The analysis is given below:—

Butterfat, 28.00; protein, 26.74; milk sugar, 38.00; ash, 5.76; water, 1.50.

The preparation is slightly deficient in fat, but this is of no great importance in tropical countries.

As a substitute for cane sugar dextri-maltose is recommended. It consists of maltose 51 per cent., dextrin 47 per cent., sodium chloride 2 per cent. It is specially indicated for infants in whom it is desired to get an increase in weight "without causing sugar disturbance." It is probably not known to many officers in the tropics that tomato juice is as satisfactory as orange juice for children who are fed on the ordinary sweetened condensed milk; even tinned tomato juice is efficacious if the fresh fruit is not available.

## CONSERVANCY.

TEMPLE (Frederick Charles). "Notes on the Drainage of Country Towns in the Plains of India."—The Institution of Civil Engineers. Selected Engineering Papers. No. 16. 31 pp.

In the last number we published a review of a paper written by Mr. Temple, Sanitary Engineer for the Tata Steel Works at Jamshedpur. We have now obtained a copy of the original article and find in it much that is of very great interest to all sanitarians in the East. We strongly recommend that the paper be consulted in original by sanitary engineers generally.

The following brief résumé is given by the author himself:—

"A town that does not contain more than 5,000 persons can probably do very well without any drainage system at all. When the population exceeds 5,000, a surface drainage system for storm water and

sullage will materially improve the sanitary condition of the town. It should be designed as a complete whole, whether it is all carried out at one time or not. The drains should be capable of taking a discharge of  $\frac{1}{4}$  inch per hour from the whole of the area served. The sizes should be calculated by short lengths, and the greatest possible care should be taken to secure the full advantage of every inch of available fall by keeping the summits as near the surface as possible, and by following natural gradients instead of cutting through the subsidiary ridges. All drain junctions must be designed and constructed with the greatest care. Arrangements should be made for cleaning and flushing by pumps fitted in wells, unless there is a piped water-supply, when ground hydrants should be provided. Advantage should be taken of all possible outfalls where the dry weather sullage can be distributed over land on which coarse crops may be grown. It is not worth while to install purification works for dry weather sullage, unless the outfall is such that distribution on land is impossible and there is a serious objection to discharging the sullage in a crude state at the end of a drain (for instance, an area of a town may drain into a lake which is used for bathing purposes; in such a place it is obviously desirable to make special arrangements to purify the sullage so that it will not create a nuisance in the lake).

"As soon as a piped water supply is installed, every effort should be made to install also a water-borne sewerage system, which should be designed on as simple lines as possible. In a very flat area, deep sewers can be avoided, and a scheme brought within the financial powers of the town by septicizing the sewage in numerous small septic tanks as early as possible, and only running effluent through the sewers. This may make a gravity system possible, and even if pumping is still necessary, the depth from which the sewage has to be lifted will be much less, and the working expenses less in proportion.

"The yield of green fodder-crops grown on land manured with the sludge and irrigated with the effluent is amazing. Ten control plots of land, so barren that the local cultivators refused to cultivate it, gave the results shown in the Appendix.

"The purification is far more satisfactory than that obtained by any other method tried by the author, and the possible return in crop value is far higher. The process is, however, far too complicated for a small country town. It is possible that some one or other of the many modifications of the process now being introduced may prove suitable. If that should occur, and the crop yield be maintained at anything like that already obtained, there is good hope that the introduction of this process may bring water-borne sewerage systems within the reach of many small towns which otherwise could not consider them."

The concluding paragraphs of this report deal with the subject of activated sludge in India. The reviewer has always held the opinion that this is the real solution for the many evils that occur in that country in places that can afford the underground system of drains. Mr. Temple's installation at Jamshedpur deals with 150,000 galls. per day derived from a population of approximately 3 to 4 thousand people. He says that with a very slight modification it would be possible to deal with 240,000 galls., or approximately double the number of people. As is well known, the results of activated sludge as a manure are extremely satisfactory. This has been tested by Mr. Temple, and the following table sets out his findings under this head:—

Experiments with Oats manured in Different Ways.

Plot.	Area of each plot. Acre.	Seeds per plot.	Manure per plot.	Added nitrogen per plot.	Irrigation.	Observation.	Appearance of every plant. Sizes in inches.	Yield per plot of Green fodder. lb.	Yield per acre. lb.	Yield in units per acre.
1	1/40	{ 2½ lb. 16-12-22 }	No manure.	Nil.	Water	Growing in thin patches of pale green colour	Height, 14-0 Breadth { 0-25 of leaf 0-50 Height, 16-0 Breadth { 0-3 of leaf 0-6 Height, 17-0 Breadth { 0-3 of leaf 0-5	29-0 25-2-23	1,160	1-0
2	1/40	{ 2½ lb. 16-12-22 }	Ammonium Sulphate 7 lb.	1-4 lb.	"	Growing in thin patches of pale green colour	Height, 16-0 Breadth { 0-3 of leaf 0-6 Height, 17-0 Breadth { 0-3 of leaf 0-5	62-0 25-2-23	2,480	2-1
3	1/40	{ 2½ lb. 16-12-22 }	Cow-dung 140 lb. Ammonium Sulphate 3½ lb.	1-4 lb.	"	Growing well in thick patches of both pale and dark green	Height, 17-0 Breadth { 0-3 of leaf 0-5	336-0 15-2-23	13,440	11-6
4	1/40	{ 2½ lb. 16-12-22 }	Cow-dung 280 lb.	1-4 lb.	"	Growing well, like 3	Height, 19-0 Breadth { 0-3 of leaf 0-5 Height, 24-0 Breadth { 0-4 of leaf 0-5	194-0 14-2-23	7,760	6-7
5	1/40	{ 2½ lb. 16-12-22 }	Cow-dung 560 lb.	2-8 lb.	"	Growing well, like 3	Height, 24-0 Breadth { 0-4 of leaf 0-5 Height, 21-0 Breadth { 0-4 of leaf 0-5	222-5 14-2-23	8,900	7-7
6	1/40	{ 2½ lb. 16-12-22 }	No manure	Nil	Activated Sludge effluent	Growing well, with dark green colour	Height, 21-0 Breadth { 0-4 of leaf 0-5 Height, 30-0 Breadth { 0-4 of leaf 0-6	360-5 13-2-23	14,420	12-4
7	1/40	{ 2½ lb. 16-12-22 }	Activated sludge 1,000 gals 50 lb. D.M.	3-5 lb.	"	Growing very thickly, with dark green colour. Roots deprived of light	Height, 30-0 Breadth { 0-4 of leaf 0-6 Height, 31-0 Breadth { 0-4 of leaf 0-6	762-0 13-2-23	30,480	26-3
8	1/40	{ 2½ lb. 16-12-22 }	Activated sludge, 500 gal. 10 lb. D.M.	0-7 lb.	"	Growing thickly, with dark green colour. Roots deprived of light	Height, 31-0 Breadth { 0-4 of leaf 0-6 Height, 23-0 Breadth { 0-5 of leaf 0-7 Height, 32-0 Breadth { 0-4 of leaf 0-6	449-0 12-2-23	17,960	15-5
9	1/40	{ 2½ lb. 16-12-22 }	Ammonium Sulphate 7 lb.	1-4 lb.	"	Growing in thin patches	Height, 23-0 Breadth { 0-5 of leaf 0-7 Height, 32-0 Breadth { 0-4 of leaf 0-6	128-0 12-2-23	5,120	4-4
10	1/40	{ 2½ lb. 16-12-22 }	Cow-dung 560 lb.	2-8 lb.	"	Growing well, with dark green colour	Height, 32-0 Breadth { 0-4 of leaf 0-6	410-0 12-2-23	16,400	14-1

O'SHAUGHNESSY (F. R.). **Sewage Disposal and the Community.**—  
—*Surveyor & Municipal & County Engineer.* 1924. July 11.  
Vol. 66. No. 1695. pp. 37-39.

The following short extract is taken from the above paper concerning the economic effect of the drainage in the town of Colombo:—

"Mr. R. E. Tickell, O.B.E., M.Inst.C.E., lately city engineer of Colombo, speaking at the Institution of Civil Engineers on Feb. 11, 1923, remarked that 'money spent upon a drainage scheme was always put down as unremunerative expenditure,' and that the commonly-accepted opinion was that it 'was merely getting rid of a waste product.' Also this 'entirely mistaken point of view carried weight with authorities who dealt with the allocation of public funds.' Quoting from a paper in the Journal of the Royal Statistical Society ('The Statistics of Industrial Morbidity in Great Britain,' by E. A. Rusher, Vol. lxxxv (1922), p. 27), Mr. Tickell indicated that 'the economic value of the drainage was the benefit derived from a reduction in the rate of sickness,' the average time of sickness being 180 weeks for each death. Following the installation of the drainage scheme at Colombo, the death-rate fell by six per thousand, which, on a population of 300,000, meant 1,800 lives per annum. This, again, meant a saving of 324,000 weeks of sickness.

"The financial saving was as follows:—

On 1,800 funerals	...	...	...	Rs. 180,000 per annum.
Keep at only Rs. 5 per head per week	...	...	...	1,620,000 ,, ,,
Total	...	...	...	Rs. 1,800,000 ,, ,,

SILCOCK (E. J.). **Sewage Disposal of Towns on Tidal Estuaries.**—*Jl. Roy. San. Inst.* 1924. May. Vol. 44. No. 12. pp. 462-464.

"Purification by dilution in a tidal river depended upon the quantity and quality of the water into which the sewage was discharged and the velocity of flow in the river. It would be useless to dilute sewage with polluted water. The water must contain plenty of free oxygen. The quantity of river water should be sufficient to give a large degree of dilution, and the velocity of the current must be sufficient to effect diffusion of the sewage and to prevent settlement. Then it was necessary to consider the complications produced by the reversal of tidal currents, and for this reason it might be necessary to hold up the sewage and to discharge it only at certain states of the tide. If the sewage was not properly diffused, or if it were held up in pools or backwaters or places where the velocity of the current was small, sewage matters would be deposited, and these would putrefy and cause trouble. One of the main objects was, therefore, thorough diffusion of the liquid in the stream, and another was that there should be a sufficient volume of diluting water. If the suspended matter in the sewage was sufficient to produce deposit in the river, then the sewage must be treated in tanks before it was discharged. . . .

"It appeared, however, that one in 500 was a very safe figure. If it were necessary to treat sewage partially, the material in suspension could be removed. The material in solution might, however, cause a nuisance, and therefore some partial oxydising process might be needed. If that had to be done percolating filters or activated sludge treatment would provide what was required."



SHENTON (H. C. H.). **Sewage Disposal of Towns on Tidal Estuaries.**—*Jl. Roy. San. Inst.* 1924. May. Vol. 44. No. 12. pp. 464-467.

"Recently experiments have been carried out in the treatment of the sewage of London, by the activated sludge process, with results which suggest that this may prove to be the solution of the problem.

"That the activated sludge system is likely to be suitable and economical for the treatment of the sewage of towns on tidal estuaries is clear, first, because the fall which is required when filters are constructed, and which generally involves pumping, is not required in the activated sludge process; next, because the effluent can be purified to the exact degree required, and the sludge can be completely purified. These are very important advantages. . . .

"Dr. Fowler and his colleagues generously gave the result of this discovery to the world in general, allowing the manufacturer, the chemist, and the engineer to perfect the system of treating sewage by the method which they had discovered. For some years only one firm of manufacturing engineers took advantage of Dr. Fowler's discovery, but later, when the possibilities of the process had been proved on a large scale, other workers and manufacturers developed various systems, whereby treatment and partial treatment of the sewage can be effected. These systems are now before us, and it is the duty of the engineer, who has to design sewage disposal works, to find out which system is most suitable to the peculiar conditions of each case, and possibly to work out other methods.

"In considering which method may be most suitable for any particular place, the choice must be governed by a variety of special conditions, which will undoubtedly be present, and until these have been examined carefully, it is impossible to tell which method, or combination of methods, is most applicable. There are various methods—for instance, there is the diffused air system, which has been applied successfully at Manchester, Worcester, Hanley and many other places, and has been adopted for the treatment of the whole of the sewage of Reading, and for other towns in this country, and also for the treatment of the sewage of Milwaukee, Chicago, Houston Texas, Indianapolis, and many other places in America, and which is also being adopted extensively in the colonies and at many places abroad. The results of this system are, therefore, ready to hand, and ready for examination. Then, again, there is the paddle mechanical agitation system, which has been very successful in the treatment of part of the sewage of Sheffield, and which has now been adopted for the treatment of the whole of the sewage of that city. It has also been adopted at East Ham, where it is working, and at several other important places. Another very important mechanical agitation system is that invented by Mr. Bolton, in use at Bury and Birmingham. Other experiments have been carried out in the use of paddles and mechanical devices at various places, including London and Glasgow. Attempts have also been made to obtain the necessary agitation by the use of pumps and immersed propellers relying on surface aeration and so forth.

"While it is impossible to say off-hand which method should be adopted at any particular place, it is useful to consider the merits of each system in the abstract, and unless this investigation is made fully and impartially we shall come to false conclusions."

TEMPLE (F. C.). **Grit Catchers, Screens and Storm Water Tanks in Sewage Disposal Works.**—*Surveyor & Municipal & County Engineer*. 1924. Aug. 1. Vol. 66. No. 1698. pp. 105-106.

"These remarks may be summarized as a set of rules :—

"Place two sets of screens in the path of the sewage, the first with 1-in. openings, and the second with  $\frac{1}{2}$ -in. openings sufficiently far apart to admit of easy removal of the screenings.

"Ascertain the average daily dry-weather flow, and provide grit catchers of sufficient cross-sectional area to reduce velocity to 1 ft. per second, and of such a length or shape as to allow 30 ft. travel of the sewage in the grit catchers. Provide stand-by grit catchers of the same relative capacity to deal in the same way with the maximum flow to be allowed through the disposal works.

"Ascertain the maximum possible discharge of the sewer to the works, which is limited by the cross section and gradient of the sewer and the area that it drains; decide the maximum quantity of this discharge which may be allowed through the ordinary disposal works; arrange an overflow weir, above the inlet to the grit catchers, to draw off everything above that quantity; and provide storm-water tanks 120 ft. long of such a cross-section as to reduce the velocity of all that passes the overflow weir to 0.1 ft. per second.

"Unless there is some unusual condition requiring unusual treatment, a plant designed on these lines appears likely to give satisfactory service."

WILLE (W. A.). **De septic tanks van Soerabaja.**—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1924. Vol. 64. No. 2. pp. 324-338. With 3 text figs. [4 refs.]

Wille offers further criticism (see Sanitation Supplement, *ante*, p. 32) to CLEMESHA's type of septic tank, which was defended in previous issues of the same periodical by FRUMEAU, GRIJNS and VAN SANTWIJK (*loc. cit.* p. 118). In Wille's opinion the grit chamber is not an essential part of the tank, and it would soon be choked unless a considerable flush washed away a good part of the solid faeces to the second compartment of the tank, where they form the floating layer. He asserts that without a grit chamber the solid faeces are sufficiently softened to be further deteriorated. [In the annotator's opinion he mistakes CLEMESHA's term "disintegrated," which he considers equivalent with "dissolved."]\*

DOORENBOS (W. B.). **Latrines en vliegen.** [Latrines and Flies.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1924. Vol. 64. No. 2. pp. 308-312.

The author experienced much difficulty in keeping pit latrines on rubber estates free from flies. Filling of the pit with earth 5 days after burning dry material in it was not sufficient. He therefore abandoned this system and introduced receptacles (kerosene tins) in which a small quantity of weak izar solution was sufficient to repel the flies. These receptacles are emptied daily in a single well-closed sewer. He remarks that pupae and larvae may be found in the soil at a distance of over 3 feet from the latrine pits.\*

\* Summarized by Dr. W. J. Bais.

SMITH (J. Waldo). **The Beccari Process of Garbage Disposal.**—*Amer. J. Public Health.* 1924. Feb. Vol. 14. No. 2. pp. 119-121. With 1 fig. & 1 chart.

A description of a new form of disposal of street refuse called the "Beccari process," after the Medical Officer of Florence, who invented it. The description is given in the author's own words with a picture of the plant at Florence. (Fig. 61.)

"When delivered to the plant the garbage is first dumped into a court between the rows of cells and hand-picked of all those materials having a commercial value. This covers pretty nearly everything. The fermentation would be just as effective and just as rapid if this sorting were not done. The garbage at Florence differs somewhat in composition from American garbage. It contains less meat, less grape-fruit and orange rinds, and is less wet than in this country.

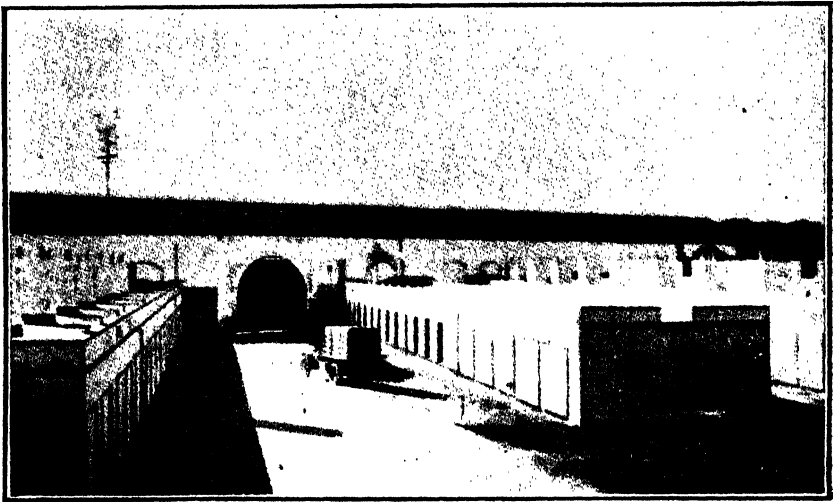


FIG. 61.—Beccari waste disposal plant at Florence, Italy, using 208 cells and dealing successfully with the garbage of a city with a population of about 250,000.

[Reproduced from the *American Journal of Public Health.*]

"The sorted garbage is then piled in the main court, where it is placed in hand carts and taken to the cells. In doing this, a check is made on the first sorting, so that all of the salvagable material is eliminated. The cells are filled so far as possible from the side doors and the remainder of the filling is done through the hatches in the tops of the cells.

"The first step in the fermentation is marked by an increase in temperature shortly after filling, up to 140° F. or more, accompanied by the development of vast numbers of bacteria. Numerous experiments have been made to discover the effect of the action of the cells upon virulent micro-organisms of typhoid, cholera, scarlet fever, trachoma, anthrax and others. It is found that even the most persistent, such as anthrax, are completely destroyed. The larvae of

flies, fleas, and other parasites are also destroyed, while the germinative power of all seeds is likewise checked.

“Bones come out clean; even the marrow is completely eaten up by the bacteria. The bodies of dead animals are completely reduced, leaving a slightly humid mass, quite without odour.

“After fermentation is complete—thirty days is the minimum time and about thirty-five the average—the product is loaded into hand carts and taken to the large storage shed. Here it is placed in a long pile about six feet or more high, and after standing from five to fifteen days is screened. That portion rejected after screening is allowed to remain in the storage shed for further reduction and then screened. To get a higher grade of fertilizer for special purposes, the product is rescreened through finer sieves. In many cases the product is taken away without screening, just as it comes from the cells.”

## SMALLPOX VACCINATION.

McVAIL (John C.). **Small-Pox and Vaccination in the Philippines.**—*Brit. Med. Jl.* 1924. Aug. 16. pp. 281-282.

“Unquestionably the health department of the Filipino Government is striving after better things. But its difficulties are immense, and no good will be done by too ready assumptions as to cause and effect in the domain of disease prevention. It is certain, however, that good vaccine, skilfully used and not destroyed on the skin of the vaccinee, will protect against variola those who resort to it and who renew their protection as may be required.

“As regards fatality rates of smallpox in 1922, the figures are (fortunately) insufficient to be of much statistical value. In Manila there were no cases, in the Provinces 12 deaths occurred in 126 cases of smallpox, and in Mindanao and Sulu 7 deaths in 14 cases. In addition there were in the Provinces 183 cases of ‘varioid’ with 4 deaths. If these be added to the smallpox figures the fatality rate is, of course, lowered. It is regrettable that neither in this nor in previous reports is any statement made as to the differential diagnosis between variola and varioid, as the terms are used in the Philippines. It would be worth knowing whether merely mild cases are put in the latter category and more severe cases in the former, or whether there are two recognizably different types of the disease. The latter view is rather supported by the fact that in nearly all the provinces where ‘varioid’ occurred there was no ‘smallpox.’ Bohol had 61 varioids, and Cavite 63, without a single death or a single registration of smallpox. The province of Oriental Negros, however, had 115 smallpox cases with 10 deaths, and 6 varioids with one death, while Samar had no death in 6 smallpox cases and 7 varioids. Very remarkably, Sorsogon had no smallpox cases, but 3 varioid, all of which were fatal. Perhaps in his next annual report, or even earlier, which would be better, the Director of Health will deal with this question, bearing as it does on the whole subject of mild smallpox, which is of so much interest to epidemiologists at the present time.”

TANON (L.). **La conservation du vaccin antivariolique dans les pays chauds.**—*Rev. Prat. Malad. des Pays Chauds.* 1924. Mar. Year 2. Vol. 3. No. 7. pp. 534–546.

The writer discusses the manufacture, storage, and transport of vaccine lymph in hot countries. His conclusions are that in Institutes in large centres cold storage and ice chests are the best way of preserving the lymph and that for dispatch into the interior dried vaccine is superior to any other.

## DISINFECTION.

BELLON (P.). **Dératisation à bord des navires.**—*Ann. d' Hyg. Publique, Industrielle et Sociale.* 1924. Apr. New Ser. Vol. 2. No. 4. pp. 245–249.

The writer discusses the somewhat vexed question of killing rats on board ship, and after comparing several methods from a large amount of practical experience he concludes that the most efficacious means is the employment of sulphur-dioxide in cylinders. A minimum quantity of 68·5 grams per cubic metre of the ship's hold is used, corresponding to a concentration of  $2\frac{1}{2}$  per cent. of gas in the atmosphere. A contact of two hours is necessary for satisfactory results, the period to commence from the time when the liberation of the gas has ceased.

MANDOUL (A. H.). **Sur la dératisation des navires. Emploi de la chloropicrine.**—*Jl. Méd. de Bordeaux.* 1924. Aug. 10. Vol. 101. No. 15. pp. 660–661. [1 ref.]

SAINT-SERNIN. **Désinsectisation des locaux à terre par la chloropicrine.**—*Ibid.* pp. 661–663.

RANDIER (P.). **Quelques réflexions au sujet de la chloropicrination du "Kronstadt."**—*Ibid.* pp. 663–665.

MARCANDIER. **Recherches sur pouvoir insecticide et bactéricide de la chloropicrine.**—*Ibid.* pp. 665–672.

These papers deal with the use of chloropicrine for killing fleas, bugs, cockroaches, etc., in ships. The matter has been frequently dealt with in these supplements. Reference is also made to the experiment on the "Kronstadt," which has also been described. It is not necessary to discuss the matter further. There is, however, one point which is new, namely, the action of chloropicrine on bacteria, which is given in the last paper. These results show that, like all other gaseous disinfectants, the efficacy depends both on the concentration and the time of exposure. In ordinary diffused light at a temperature of 17 or 18°C. the dose necessary to kill coli and staphylococcus on the surface in 24 hours appears to be 50 grammes per cubic metre. Below this point a longer exposure is necessary. The elevation of temperature and increase of humidity increases the action of the drug. The effect of light during the experiment is curious; it appears to increase the potency of chloropicrine in vapour. It is not, however, due to condensation affecting the bacteria. Chloropicrine will kill tubercle bacilli in 24 hours in air saturated with the vapour. Wet sputum is more easily sterilized than dry. Sporulating bacteria are much more difficult to kill and the results are more erratic.

FERNANDEZ (E. H.). **Two Experiments in the Use of Anhydrous HCN.**

—*Med. Jl. S. Africa.* 1924. July. Vol. 19. No. 12. pp. 378-384.

With 2 figs.

The writer describes in the following words a somewhat novel method of treating cabins of a ship with hydrocyanic acid in order to kill rats, cockroaches, etc.

"The technique employed in the operation by Messrs. Kynoch's representatives was very simple. The amount of HCN used was about 124 ozs. contained in ten 8-oz. bottles and eleven 4-oz. bottles. These bottles were placed each in a small canvas bag, like the old-fashioned watch-pocket that hung at the head of a bed, to which a string was attached. The string was fastened to a convenient support, and the bottles were placed in the position which they were destined to occupy, half on one side of the ship and half on the other. Two experimenters walked from the outer end to the after end of the place to be treated, removing the stoppers of the bottles as they went down. Having reached the far end they tipped over the bottles, so that they were hanging with the mouth downwards, the contents decanting on to the floor and tipping over each bottle in turn until all were in operation. The moment they came out into the open, the doors were battened to and the cracks and all spaces closed by having paper pasted over them.

"The solution of HCN used contains .6 cubic ft. of gas to each oz. and therefore the quantity of 124 ozs. used for 22,000 cubic ft. gave the quantity of gas released = 1 in 300. The cost of the material is about 5s. for the 8-oz. bottles and 2s. 6d. for the 4-oz. bottles, amounting in this experiment to about £4."

The occasion was used to try certain experiments with cockroaches, fleas, bugs and rats. Such practical points as whether rats or fleas shut up in cupboards would survive were investigated. The conclusions of a preliminary experiment are given as follows:—

"The closing of the lockers, as we discussed, shows by the bugs therein remaining alive, that the gas did not completely penetrate into them, though they were of rough construction and in no way airtight.

"On the other hand, the death of all other insects both at top and bottom of cabin points to an even diffusion of the gas.

"The canvas bags used to suspend the bottles upside-down, so that the liquid could run out slowly compared to the breaking of an ampoule, appears a decided improvement.

"The death of the five fleas in the locker against the death of only two of the bedbugs is interesting."

General Conclusions. "That an opening of small size makes little or no practical difference to actual results. It must be remembered that it may be a source of potential danger to curious and ignorant onlookers.

"That the concentration of HCN in the neighbourhood of the middle stratum of air is sufficiently powerful for all practical purposes after the expiration of fifteen minutes.

"That the higher and sufficiently lethal concentrations of the HCN are first found in the upper strata of air and that the time required to reach these levels, if of reasonable height, is not more than fifteen minutes.

"Diffusion. That the concentration at the lower levels naturally takes the longest time to give a lethal dose; about three inches above

the level at which the HCN was poured, the concentration after 45 minutes was only  $\frac{1}{1120}$  but after 80 and 95 minutes, samples of air taken from the same spot showed a concentration of  $\frac{1}{320}$ .

"That an ordinary cupboard at or below the level at which the HCN is poured will not admit sufficient gas to give results of any value within two hours, and since the concentration was only  $\frac{1}{1650}$  65 minutes, and  $\frac{1}{1600}$  80 minutes after pouring, it does not seem likely that there would be sufficient subsequent improvement to be of any value. The American Quarantine regulations (1920) specify for the destruction of rats and mice an exposure for two hours to a strength of  $\frac{1}{437}$ . Samples of air taken from just outside the door of this cupboard showed a concentration of  $\frac{1}{350}$  80 minutes after pouring and  $\frac{1}{320}$  95 minutes after. It is therefore advisable to see that all cupboard doors at or below floor level are left open during operations.

"Cupboards more favourably situated in regard to height from the floor do not offer sufficient protection to keep alive rats even when the doors are closed and turned to face close up against a wall. At the same time, when the marked difference in concentration which must be found inside and outside cupboard doors is considered, it is better that all such should be left open."

PUBLIC HEALTH REPORTS, 1924. Mar. 14. Vol. 39. No. 11. p. 529.

**—Cyanogen Chloride Gas Mixture. Irritating Quality of New Fumigant saves the Life of a Stowaway on Vessel being fumigated.**

The writer describes how when fumigating a vessel with cyanogen chloride a stowaway was driven out, before he was poisoned, owing to the irritant effect of the gas. Although in a dazed condition he rapidly recovered. Had HCN been used he probably would have died.

JOFFICK (S. D.). **Observations on Kerosene as a Delousing Agent.**—*China Med. J.* 1924. Apr. Vol. 38. No. 4. pp. 318-322. [7 refs.]

The writer was engaged on famine relief work of the American Red Cross and had occasion to delouse the clothes of a large number of people. "The billets were disinfected by coal tar solution (3-5 per cent.). The bedding was put in the sun and sprayed with kerosene. The clothing was ironed. The coolies themselves were given a kerosene bath. Their clothing was frequently also treated with kerosene. This was the routine used for disinfection."

As a result of these measures kerosene oil baths became distinctly unpopular, and no amount of endeavour on the part of the writer was able to overcome this. He therefore came to the conclusion that kerosene was not altogether a satisfactory insecticide for lice, and made certain experiments of his own, the results of which are given.

"Result 1. After one to two minutes' immersion, out of the groups totalling 100 lice, 86 recovered, and 72 of these laid eggs after being fed.

"2. After three minutes' immersion, out of a similar number 42 recovered, and 11 of these laid eggs after being fed.

"3. After four minutes' immersion, 8 seemed to recover, but soon died.

"4. After five minutes' immersion, none recovered."

These results do not differ from what has been known for a long time, the explanation of which is given by BACOT.

" 'Lice are not passive but active factors in process of immersion, protecting themselves against the entrance of fluids by closing the spiracles.' "

## CHILD WELFARE.

FIGUEIRA (Fernandes). **Quelles sont les meilleures manières de protéger l'enfant de l'ouvrière employée dans l'industrie ou le commerce?**—*Bull. Internat. de la Protection de l'Enfance.* 1924. May 31. No. 26. pp. 490-498.

This paper deals with the treatment of mothers and children at the breast, both those who remain at home and those who work in factories in Brazil.

For the latter crèches are provided, in which only children of very tender age are accepted. The crèche consists of a room set apart for feeding the children, a school for mothers, and a register of the results of domiciliary visits of the health visitor. Samples of forms filled in for this are given in the paper, as also are the enactments establishing and regulating the crèche.

As regards the mother who remains at home, it is found that in Brazil about 35 per cent. prefer to abandon their employment if they have the necessary means. The mother then has recourse to dispensaries should necessity arise and is visited by the health visitor twice a month.

Woo (S. M.). **The Problem of School Hygiene in China.**—*Nat. Med. Jl. China.* 1924. Apr. Vol. 10. No. 2. pp. 98-100.

In discussing this subject the writer lays down the following principles: Concentrate (1) on health education and (2) on the young; (3) the centre of effort is the school. It is pointed out that there are many difficulties; doctors, nurses, dentists are required; money is very scarce.

## REPORTS AND VITAL STATISTICS.

ACCRA. **Report of the Medical Officer of Health, Accra, for the Year 1922.** [SELWYN-CLARKE (P. S.), Medical Officer of Health.]—69 pp. With 20 figs. & 2 charts. 1923. London: Waterlow & Sons, Ltd., London Wall. [Price 4s.]

"The year 1922 was without example in the annals of the Council in the great achievements of the Council during the period. To name a few of these: the Council built model quarters for the Kroo labourers employed on conservancy work at Christiansborg; the Council completed and equipped a section of the New Market and had a further 17 well constructed stalls built on to the completed section; the Council converted the old offices of the African and Eastern Telegraph



Co., in Horse Road, into spacious new offices for the Council; the Council had the mule transport stables entirely re-roofed and put in an excellent condition of repair; the Council had model stables to house 20 mules and horses built on land adjoining its own stables for owners of horses who were not in a position financially to build sanitary stables in the municipality; and, lastly, the Council performed many other duties—inadequately dealt with in this report—in the interests of the health and well-being of the community, as, for example, passing legislation regarding latrines, ventilation of houses and the efficient working of markets.

“The writer ventures to hope that some, at least, of the recommendations he has embodied in this report may receive the support of yourself and the honourable members of the Council.”

Evidently, from the above quotation, there is a great deal of sanitary improvement in progress in Accra.

Four cases of yellow fever occurred in the year under report, but anti-mosquito measures primarily directed against malaria have had a considerable influence on this disease. No case of cholera occurred. There were two cases of cerebro-spinal meningitis. Dysentery, diarrhoea and enteritis are very prevalent causes of death, over 14 per cent. of the deaths being recorded under this head. Amoebic dysentery appears to be common. The Medical Officer considers that little or nothing can be done until a more suitable and up-to-date method of sewage disposal is adopted. This he anticipates will be accomplished shortly. No plague occurred during the year. In six suspected cases of small-pox the diagnosis was doubtful. Tuberculosis is a frequent cause of death and would appear by a graph to be on the increase; but measures for its eradication are very difficult in such a primitive population, though every endeavour is being made.

“The following is a list of the chief desiderata as regards sanitary improvements in Accra:—

“1. Water-carriage system of sewage disposal—the feasibility of this is dependent to a large extent on the water supply to the town, and for this reason the present system of storing water will have to undergo some modification, possibly in the direction of substituting an up-to-date chlorination system and of increasing the capacity of the storage reservoirs.

“2. Provision of more latrines, dustbins, wash-houses, concrete drains and public standpipes.

“3. Relief of congested areas, including the provision of healthy dwellings.

“4. The tarring of all the main roads in the town.

“5. Provision of electric lighting. One of the difficulties encountered at present in the prosecution of the anti-tuberculosis campaign consists of the permanent nailing up of windows by house-owners in order to prevent the ingress of thieves. The members of this fraternity are less likely to operate in a well-lit town.

“6. Compulsory notification of Phthisis and Leprosy by all registered medical practitioners.

“7. Provision of at least two partly trained and subsidised midwives.

“8. Registration and Licensing of Schools.

“9. Registration and Licensing of Bakeries.

“10. Provision of a suitable site for the drying, curing and smoking of fish.

" 11. Provision of a school medical officer and a medical officer to organise an infant welfare clinic and pre-natal and post-natal clinic for prospective mothers.

" 12. Vigorous propaganda against venereal disease.

" 13. Inoculation against Enteric of officials coming to the Colony.

" 14. Provision of suitable quarters for officials to avoid the hardship and undesirable practice of 'doubling up'."

A health week, the main object of which was to clean up the whole town, has met with a very lively response from the people generally. The two illustrations (Figs. 62 and 63) give some idea of what the rubbish removal department had to face as a result.

GAMBIA, Colony of. **The Annual Medical and Sanitary Report for the Year 1923.** [ALLAN (K. B.), Acting Senior Medical Officer.]—43 pp. London: Crown Agents for the Colonies, 4 Millbank, S.W.1. [Price 5s.]

Dr. Frank A. INNES, M.O.H., writes as follows:—

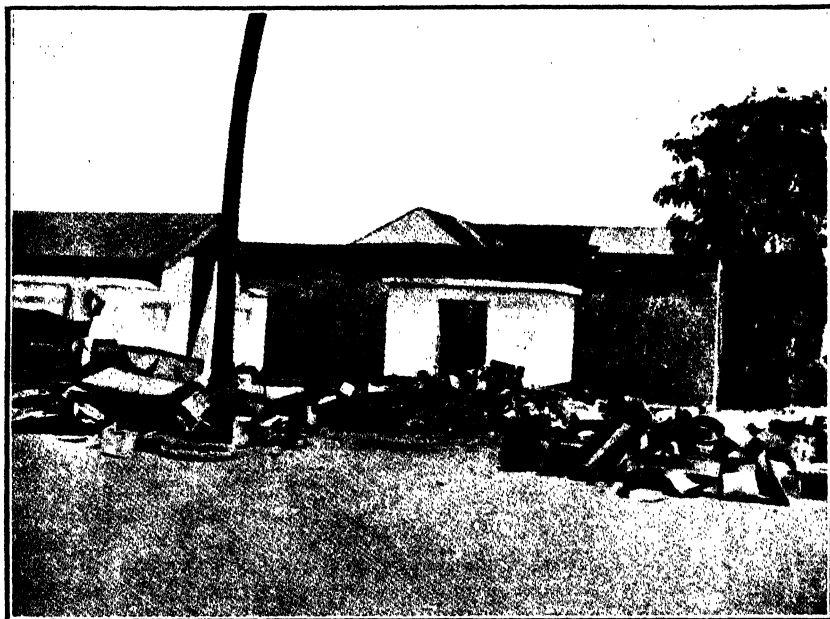
" *Vital Statistics and Child Welfare.*—The year's returns do not entitle us to any marks for progress. The general death rate is 43·06; this gives an average for the quinquennium of 42·75 per mille.

" The birth rate is 26·65, being the lowest on record since 1900, when 23·5 was given as the figure. For the quinquennium it is 28·99. Deaths have outnumbered births by 157. This figure has been exceeded twice since 1901, viz., in 1920, when the excess deaths were 170, and in 1918—the 'flu' year—when they reached 289. Figures were given last year to show that only thrice in the last twenty-two years have births been more numerous than deaths, viz., 1909 by 10, 1916 by 10, and 1917 by 73. It may not be pleasing, but it is plausible, to liken the life of Bathurst to that of a cancer which, unable to maintain the vitality of its own cells, involves neighbouring ones in the common disaster. Bathurst cannot maintain its own life and it only continues its career by imported lives.

" *Infant mortality.*—The infant mortality rate is practically undiminished. The 1923 figure is 498, as against 502 last year; so it is still true that every second child dies within a year of birth. These rates must be considered, of course, in the light of the great drop in the 1923 birth rate, which makes the 498 theoretically worse. . . .

" *Lectures and school instruction.*—A course of public lectures on Hygiene in simple English is given annually by a Medical Officer. School children, teachers, and Public Health Inspectors are specially invited to attend. The last class roll numbered 69. In the examination at the close only 13 out of 45 gained the pass mark. Of course, hygiene is also a subject in the schools curriculum; and in the December examination 16 pupils were presented of whom 8 passed the examination.

" Now it is wise and right to prescribe and conduct such lectures and lessons, and to expect results from them. Meantime the elder people consider it all a 'stunt' for school boys, they themselves being stimulated to antagonistic interest in hygiene only when the Inspector 'humbugs' them by professing to find 'laavee' in their wells and



FIGS. 62 and 63.—Two public dustbins *after* the usual loads of refuse had been removed on the first working day of the Accra Health Week, October 8th-14th, 1922.

[Reproduced from the *Report of the Medical Officer of Health, Accra, for the year 1922.*]

coolers—with the grossly unwelcome, and to them unfair, sequel of Court proceedings and a fine of 2s. 6d. upwards! It may be asked, how long this is to last, and whether remedy can be provided? We go on fining people for breaking the law, but we cannot claim that we offer much instruction to help them to keep it. Would it be impossible for Government to provide an educational lantern (electric light), with a suitable selection of scientific slides in tropical medicine and hygiene, a lecturer, and an interpreter, for a succession of public demonstration-lessons, so as to interest the people outside the boy and girl of school age? Such an effort to interest and educate the public in their own affairs of life and death would surely help to make civic and social wheels move more worthily and healthily, in contrast with our poor results from time and money expended in compelling and castigating this large community recalcitrant because ignorant!"

BOYD (J. J.). **Infantile Mortality in South Africa and New Zealand.**—*S. African Med. Rec.* 1924. July 26. Vol. 22. No. 14. pp. 321–330. With 3 charts.

The writer gives an interesting comparison between the infant mortality in the towns of New Zealand (where it is very low) and towns and districts of South Africa. It appears to have been claimed that the favourable results in New Zealand are largely due to the system of mothercraft started there by Dr. Truby KING, and it has been contended that if that system were applied to South Africa the local figures would be considerably lowered. The writer, however, points out:—

"That New Zealand has at no time in its history experienced infantile mortality rates anything like as high as those which prevailed in South Africa up to the end of the nineteenth century.

"That the fall in the New Zealand rates since 1904 has been about 50 per cent., whilst the fall in the South African town rates has also been about 50 per cent. during the same period.

"That the fall in the New Zealand rate is largely due to other factors than the teaching of mothercraft, without denying the importance of such teaching.

"That the fall in certain towns and districts of South Africa is similarly largely due to other factors than the teaching of mothercraft.

"That several of the South African towns have already attained infant mortality rates which are little, if at all, inferior to the average New Zealand town.

"That it is in the small towns and villages of South Africa that infantile mortality is highest."

The following remedial measures are recommended by the author:—

"1. The establishment of local Health Authorities, either Town or District Councils, throughout the Union.

"2. The appointment of properly qualified whole-time Health Officers and Sanitary Inspectors for such areas, individually or for combinations of areas, and the appointment of Health Visitors for Child Welfare work.

"3. The education of the people, parents, school teachers, boys and girls in the principles of health and parental responsibility.

" 4. The elimination of the native as far as possible from the care of European children.

" 5. The annual publication by the Union Health Department of statistics regarding health and infantile welfare in the Union. The present form of report is much too meagre."

**TANGANYIKA TERRITORY. Annual Medical Report [DAVEY (J. B.), P.M.O.]. Annual Report of the Sanitation Branch of the Medical Department. Report of the Dar-es-Salaam Laboratory [BUTLER (G. G.), for the Year 1922.—212 pp. With 8 charts & 1 map.**

The annual report of this Territory is of great interest though the country is not yet highly developed. This can be seen from the following recommendations of the Principal Medical Officer :—

" 1. An organised staff of sanitary officers for public health duties in the larger townships and on the railway lines. Better sanitary work will be done by officers who are assured against liability to recall to ordinary medical duties.

" 2. Increase of the medical staff to provide (1) a district Medical Officer for each of the eighteen larger administrative districts ; (2) Medical Officers for special duties in connection with epidemic diseases—plague, sleeping sickness, yaws, venereal disease.

" 3. The appointment of an Office Superintendent to the Principal Medical Officer's office where the volume of correspondence, much of it of a confidential nature, is very large. Proper records cannot be kept with the existing staff, and the amount of detail work required of the Administrative Officers is very large.

" 4. Strengthening the staff of the Dar-es-Salaam Laboratory by the appointment of an Assistant Bacteriologist and a Medical Entomologist.

" 5. The replacement of grass and wattle and daub hospital wards by permanent structures and the provision of the latter in stations for which it is proposed to provide Medical Officers when the Staff is augmented.

" 6. The reduction of vegetation, notably cocoanut, palms and heavy foliated trees, in towns on the coast and in other unhealthy places. The clearing of old cocoanut palms from the Botanical Gardens, Dar-es-Salaam, is a measure which has been urged both by the Medical and Agricultural Departments from different points of view. The Botanical Gardens, Dar-es-Salaam, should be cleared to such an extent as to render them of value as an open space instead of, as now, acting as a nursery of and refuge for mosquitoes and a screen cutting off the sea breeze from residences.

" 7. Better facilities for the isolation of infectious disease in the principal settlements.

" 8. Registration of births and deaths, in all classes, in all townships.

" 9. The careful restriction of the number of returns required of members of the department specially on financial matters.

" 10. Whenever funds are available, two-storied houses, in preference to bungalows, should be erected for officials in stations with trying climates, such as the coast towns.

" 11. The appointment of a Building Inspector under the Dar-es-Salaam Township Authority.

" 12. The appointment of a Surgeon Specialist for headquarters."

With reference to Dr. HOWARTH'S investigation of cocoanut trees as breeding places for mosquitoes Dr. G. G. Butler writes :—

“ As his investigation is not yet completed, I can only allude to his reports sent in from this laboratory.

		Palms examined.	Per cent. holding water.	Per cent. with larvae.
January	... ..	64	70·3	61·8
February	... ..	347	80·1	78·3
March	... ..	332	97·6	96·6
April	... ..	482	98·2	97·2
May	... ..	362	99·7	99·4
June	... ..	347	100	99·4
July	... ..	334	100	99·4
August	... ..	76	100	100

“ Anophelines, *Aedes*, *Megarhinus* and *Culex* are the main genera to which the mosquitoes belong.

“ The importance of the observations that even the highest cocoanut tree may form breeding places for mosquitoes is obvious to all workers in similar districts in the tropics.”

**INDIA. Annual Report of the Public Health Commissioner with the Government of India for 1920 with Appendices and Returns of Sickness and Mortality among European Troops, Indian Troops, and Prisoners in India for the Year.** [FRY (A. B.), Officiating Public Health Commissioner.]—pp. iv+135+xxix+149. With 7 charts. 1922. Calcutta: Supt. Govt. Printing, India. [Price 3 rupees 12 annas.]

General Population Infant Mortality figures.—“ A study of the figures shows :

“ Firstly, that, for all India, of 100 infants which fail to survive the first year of life, no less than 43 die in the first week.

“ Secondly, that in practically all the provinces the total deaths of infants in the first week of life are greater than the total deaths in the succeeding three weeks.

“ Thirdly, that the deaths in the five months from the beginning of the second to the end of the sixth are 50 per cent. more than those in the last six months of the year.

“ It is not yet safe to enter into a detailed statistical analysis of these figures. A few more years' tabulation will be required to enable us to make out by the presence or absence of discrepancies how far these returns are reliable.

“ The recording of a high rate of infantile mortality has always been a regrettable feature of these reports since statistics were first compiled.

“ The causes are many ; the poverty of the vast bulk of the population, the custom of early marriage, and the general lack of sanitation in the homes of the people have been noted on frequently.”

Midwifery in India.—“ The malpractices of the dhai class . . . . may be summarised by saying that labour is never left alone ; frequent vaginal examinations with dirty hands, early rupture of membranes

before the *os uteri* is half dilated, and forcible pressure of the abdomen in the absence of pains, is the routine.

"Immediately the child is born the placenta is attacked. The unfortunate mother is often given an emetic. If the vomiting fails to expel the placenta it is removed by pulling on the cord or piecemeal by hand. The vagina is then packed with oiled wool. The placenta is buried at the head of the patient's bed in a shallow hole. In a small room with India's climate the resulting stench after a few days may be imagined.

"The child is maltreated even worse than the mother. The cord is cut with anything handy, and the most common thing to use for ligature is the hair-string from the mother's head, a greasy cord which she has worn for months. The usual tongue-tie operation is then performed. The most amazing thing is that the child is allowed no nourishment for three days but is kept quiet with opium. As may be imagined, this leads to marasmus in the child and great discomfort to the nursing mother.

"If labour is complicated by abnormal presentation or other accidents the *dhai* is completely helpless and unless rescued by someone with a knowledge of midwifery practice both mother and child commonly die."

Fever Death rate.—"United Provinces.—The Sanitary Commissioner, in accordance with the informal resolution of the Sanitary Commissioners Conference, improved his registration and has added to his tables a supplementary form showing division of the heading 'fevers.' His results are very interesting. Of a total number of fever deaths, viz., 1,442,376, he records—

Malarial fevers ...	...	...	...	1,010,614
Enteric fever ...	...	...	...	68,593
Measles ...	...	...	...	20,116
Relapsing fever ...	...	...	...	5,243
Kala-azar ...	...	...	...	4,666
Other fevers ...	...	...	...	333,144

"The Sanitary Commissioner conjectures that the 'other fevers' heading includes the majority of kala-azar, enteric and relapsing fever.

"The mortality curve rose steadily to an apex in June and fell to its lowest point in August. This was followed by a second rise in September and October, when it is stated that malaria was more or less epidemic.

"A very vigorous quinine policy was pursued, both of free distribution and sale by numerous agencies, post offices, patwaris, landlords and vaccinators. Civil Surgeons reported relapsing fever from no less than thirteen districts. Influenza prevailed during the first half of the year, but was of a mild type, yet it may be presumed to be the cause of the rise of the mortality curve up to June. The estimated death rate from influenza is put down at 4.41 per mille. This figure is arrived at by calculating the excess total mortality of 1920 over the average for 1916, 1917 and 1919 as representing influenza deaths. This method can hardly be regarded as accurate except for enormous figures such as the seven million excess deaths ascribed to the influenza pandemic of 1918.

"The report on fevers is very full, and it is to be hoped that in future years all provincial Sanitary Commissioners will write a history of the chief fevers and a full analysis of this most interesting and important section of their narrative."

**MADRAS. Annual Report of the Health Officer of the City of Madras for the Year 1922.** [RAO (K. Raghavendra), Health Officer.]—120 pp. With 6 charts, 1 map & 1 plate. 1923. Madras: Printed by S. Murthy & Co. at the "Kapalee Press," 305 Thambu Chetty Street.

Population. 526,911.

Birth rate. 41·1 per 1,000 of the population.

Death rate. 42·7 per 1,000 of the population.

Infantile death rate. 308 per 1,000 children born.

Smallpox.—There were more than 1,000 deaths, which represents a death rate of 2·1 per 1,000 of the population. This figure exceeds that of malaria, which was 1·4, and other infectious diseases, 1·2. There was practically no plague. Dysentery and diarrhoea represents 7·9 deaths per 1,000 of the population, and respiratory disease 9·3.

The water supply of the city is still rather unsatisfactory. The slow sand filters are reported as not working well.

The writer points out that not only is the death rate amongst infants high, but 293 deaths occurred in childbirth amongst the mothers. Child welfare work still receives a large amount of attention, and it undoubtedly is extremely valuable in spite of the fact that there has been a slight rise in the infant mortality during the current year.

**MADRAS. Report on the Working of the King Institute of Preventive Medicine, Guindy, for the Official Year 1922-23.** (With Appendices.) [CUNNINGHAM (J.), Director.]—pp. 58+2. With 4 charts. 1924. Madras: Printed by the Supt., Govt. Press. [Price 1 rupee 12 annas.]

*Vaccination.*—2,079,915 doses of vaccine lymph were issued during the current year, an increase of over  $\frac{1}{4}$  million. The new method, NEJLAND'S, with a minor modification, has been found extremely successful in Madras, and the seed lymph is kept up to suitable strength without any extraneous aid.

"The success rates for lanoline and glycerine lymphs taken separately are as follows :—

				Case.	Insertion.
Lanoline	...	...	...	77·1	48·4
Glycerine	...	...	...	89·7	73·6

"These rates are almost identical with those obtained last year and simply bear out the conclusions already expressed with regard to the relative merits of these two types of lymph. These figures once more show the desirability of discontinuing the routine issue of lanoline lymph as soon as possible in favour of glycerinated lymph. . . .

"*Experiments as to the feasibility of purifying glycerinated lymph by the chloroform process.*— . . . Taking the figures as a whole there is not much difference between the results obtained with the treated and untreated lymphs. . . . The case and insertion success rates for the untreated lymph (88·7 and 80·8) are slightly better than those of the samples exposed to the chloroform vapour (85·8 and 79·0). Further, the number of lymphs producing a case success rate of over 90 per cent. is distinctly greater in the untreated series although the insertion success rate is better in the case of the chloroformed lymph. . . . The reduction in the extraneous bacteria was always much more marked in the case of the treated samples. The number of bacteria per c.cm.



varied between 580 and countless for the untreated and 0.3 and 5.6 for the treated lymphs. The results of the experiments so far conducted would indicate that the chloroform process undoubtedly depreciates the potency of the lymph to some extent, especially if carried on sufficiently long to kill all bacteria present in the lymph. This vaccinicidal action is somewhat uncertain and is not fully under control, some batches of lymph giving evidence of very considerable destruction, others although subjected to the same treatment showing little or no degeneration."

*Bacteriological Section.*—"A test to the *B. paratyphosus* C has now been added as a routine to the usual tests performed with *B. typhosus*, *B. paratyphosus* A, *B. paratyphosus* B, and *Micrococcus melitensis*. Four hundred and fifty-six sera were returned as positive to one or other of typhoid group of organisms. The details of these cases are of some interest as giving an index of the relative frequency of infections with these organisms in Madras :—

258 cases were positive to *B. typhosus* alone,

9 cases were positive to *B. paratyphosus* A alone,

1 case was positive to *B. paratyphosus* A alone, and

5 cases were positive to *B. paratyphosus* C alone."

71 specimens for examination for dysentery bacilli were received. Specific organisms were found in 20 (Shiga 7, Flexner 12, Morgan's bacillus 1), and a large number of vaccine reactions were performed during the year.

A special feature of the year has been a large number of specimens received for diagnosis of relapsing fever; spirochaetes were found from many parts in Madras, and it is thus evident that the disease was and is widely distributed over the Presidency.

*Investigation Units.*—"The following units were sent out from the Institute during the year under report :—

"1. One unit to form a camp laboratory at Alipuram Jail.

"2. One unit to investigate relapsing fever in Tanjore district.

"3. One unit to investigate an outbreak of typhoid fever at St. George's Home, Kaity.

"4. One unit to investigate an outbreak of cholera at the Central Jail, Coimbatore.

"5. One unit to form a clearing bacteriological laboratory for the Mappilla prisoners at the Cannanore Central Jail.

"6. One unit to investigate a severe outbreak of fever amongst officials belonging to the Forest Department at Olavakote."

The investigation of the Tanjore district showed that the sickness was largely due to relapsing fever. Investigation at Kaity had to be rather prematurely closed, sanitary recommendations being made. The unit at Coimbatore jail showed that the water in two wells was contaminated and cholera vibrios were found in the stools of one of the cooks; appropriate measures brought the outbreak to an abrupt end.

SHANGHAI. **Shanghai Municipal Council Public Health Department.**  
**Report of the Commissioner of Public Health, 1923.** [DAVIS (C. Noel), Commissioner of Public Health.]—50 pp. With 1 chart & 1 illustration. 1924. Shanghai: Kelly & Walsh Ltd., 30, Ferry Road.

"There are few cities in the world so peculiarly situated as Shanghai, or so perilously exposed to visitations of epidemic disease. Smallpox,

cholera and typhus are all present at some time during the year, but it is eight years since the occurrence of the last case of human plague.

"By favour of fortune, and by ceaseless vigilance, these diseases have never become epidemic in the International Settlement, and the standard of the public health remains high. The past year was unusually healthy. The death rate among Foreigners was comparatively low, being 17·2 a thousand compared with 19·3 last year.

"Freedom from serious outbreak of communicable disease was especially gratifying in view of the unusual risks run on account of the great influx of refugees, epidemics of plague and smallpox in Hongkong and Canton, and the presence of plague in other Far Eastern ports, all in maritime communication with Shanghai.

"The largest number of deaths among Foreigners, as in previous years, was caused by the Respiratory and Alimentary Groups of Communicable Disease. Both were appreciably lower than last year.

"The heaviest mortality from the typhoid group of fevers and from pulmonary tuberculosis was among the Japanese, being 88 per cent. and 58 per cent. respectively of the whole.

"There were 27 deaths from the typhoid group and 9 from the dysenteries, compared with 46 and 14 last year.

"No deaths occurred from scarlet fever or from diphtheria.

"The death rate among the Chinese was 10·3 a thousand, compared with 11·7 last year, and is the lowest on record.

"It is not altogether a true index of the health of the Chinese within the Settlement, for when they suffer from chronic or incurable complaints, they usually leave the Settlement for their native homes and there await death. The mortality recorded, therefore, is chiefly due to accidents and acute disease.

"The death rate from communicable disease was 17·8 per cent. of the whole.

"The accuracy of vital statistics was increased by revising the nomenclature of recorded disease, and by the issue of a more comprehensive Death Certificate.

"Vaccination against smallpox was carried on with great vigour in view of the epidemic in Hongkong. Altogether 45,086 free vaccinations were done. Of these 40,828 were at the Branch Health Offices. The previous highest record was 33,962 in 1921. Eighty-one per cent. of the number were infants under one, and children under 15 years of age.

"The free Municipal Clinic for Venereal Diseases made a most successful start, and already hospital accommodation for In-patients has become necessary. Future developments will include a clinic for women and for Chinese. The venereal diseases are among the most easily preventable, but the problem is confused with ethical, social and religious considerations, and can only be solved if approached in a scientific spirit, with frankness and courage. . . .

"The problems of Public Health in Shanghai are daily growing more difficult and complicated. In some ways it is one of the most remarkable cities in the world, for none of its achievements in Public Health have been by compulsion, but all by educative tact and persuasion, and by the common-sense, goodwill and enlightened co-operation of the people.

"One of the most dangerous conditions favouring the spread of epidemic disease is that of overcrowding among the Chinese—a habit descended from ancient feudal times, when they herded together within walls, for defence against marauders.

"In one area north of the Soochow Creek the density of population is about 2,000 an acre, compared with an average of 152 an acre throughout the Settlement.

"It is greatly to the credit of Shanghai that so much has been achieved in the past with such small compulsory powers. Vaccination, for instance, is not compulsory, yet over a quarter of a million free vaccinations have been done within the last 20 years, with a great saving of life; but on account of the enormous growth and development of the city, and because the control and suppression of communicable and epidemic diseases depends fundamentally on accurate knowledge of their prevalence, and on power to deal promptly and efficiently with conditions that favour the spread of such diseases, the need becomes urgent for Public Health legislation dealing with:—

- "1. Prevention of overcrowding.
- "2. Compulsory registration of medical practitioners.
- "3. Compulsory notification of communicable diseases and registration of deaths.
- "4. Compulsory isolation of cases of communicable disease where means of isolation in the home are inadequate, or when such isolation is undesirable."

*Water Supply.*—"A systematic investigation, extending over 14 months, has shown that the processes employed at the Waterworks are capable of reducing the number of lactose-fermenting organisms of the *B. coli* group to 40 per litre at all seasons of the year, and, with rare exceptions, this standard has been maintained. It is a high standard, and the quality of the supply is most creditable to the Waterworks authorities. The water, however, has fallen short of this standard during three short periods in the year. One of these failures was definitely traced to leakage from a newly laid sewer, and the contamination was limited to a small area; on another occasion samples from widely separated hydrants were found to be badly contaminated at intervals during ten days. This was probably due to some failure of purification at the Works. These occasional lapses illustrate the importance of domestic treatment of the water by boiling or filtration through a properly kept germ-proof filter."

**LI TING-AN. The Death Rate of Hongkong as a Criterion of Mortality in China.**—*Nat. Med. Jl. China.* 1924. Feb. Vol. 10. No. 1. pp. 25-32. [2 refs.]

*Summary.*—"1. Attention is called to the necessity of standardizing the crude death rate, particularly that of a small city.

"2. The crude death rate of the Chinese in Hongkong in 1922 has been wrongly computed and reported by the Sanitary Department of Hongkong. The correct crude death rate is 22.01 per 1,000.

"3. The standardized death rate of the Chinese in Hongkong in 1922 is 27.57 per 1,000.

"4. The standardized death rate from all forms of tuberculosis of the Chinese in Hongkong in the year 1922 is 369.62 per 100,000 population.

"5. The infant death rate of the Chinese children in Hongkong in 1922 is 289.98 per 1,000.

" 6. It is reasonable to assume, in lack of other data, that the figures computed for Hongkong indicate approximately the rates of mortality that will be found for South China, when accurate statistics become available, except for years of large epidemics."

Standardized Death Rate for Hongkong in the year 1922.

Age Group.	Percentage age distribution of population of Hongkong in 1922.	Number of persons in Hongkong alive in middle of 1922.	Total Deaths in age groups.	Specific age death rate per 1,000.	Standard million of England and Wales in 1901.	Death rate standard million if the Hongkong death rates were used.
0-5	8.16%	52,795	6,383	120.90	114,262	13,814
5-15	16.10%	104,167	1,080	10.37	209,944	2,177
15-25	25.10%	162,397	1,139	7.01	195,742	1,358
25-45	37.60%	243,272	2,624	10.78	284,428	3,066
45-	12.70%	82,169	3,006	36.58	195,624	7,156
Total		644,800			1,000,000	27,571

WINSLOW (C. E. A.) & KOH (Z. W.). **The Mortality of the Chinese in the United States, Hawaii and the Philippines.**—*Amer. J. Hyg.* 1924. July. Vol. 4. No. 4. pp. 330-355. With 11 charts.

" 1. The crude death rate of the Chinese in the United States is very high (27.1 per 1,000, for the States of California, Oregon and Washington in 1919-1920, as against 12.4 for the total population of these States).

" 2. This excessive mortality is in large part due to the abnormal age distribution of the Chinese in the United States. Standardization, on the basis of the standard million of England and Wales in 1901, reduces the Chinese rate to 20.0 and the total rate for the entire population of the three States to 11.4.

" 3. In the city of Manila the crude mortality for the Chinese is much lower than in the United States, and in Hawaii it is lower still. The comparative figures for 1920 are: Registration States, 24.3; Manila, 18.4; Hawaii, 16.9. In both Manila and Hawaii the Chinese rates are intermediate between those for Caucasians and those for the native races (Hawaiian and Filipino).

" 4. Standardization reduces the Chinese death rate in Hawaii for 1919-1920 from 15.8 to 15.3, while it increases the rate for Caucasians from 12.5 to 13.2, leaving a relatively small difference between the two race stocks.

" 5. Analysis of deaths by cause indicates that the Chinese in all three regions studied exhibit a consistent and apparently characteristic excessive mortality from tuberculosis, from circulatory disease, and from genito-urinary diseases, as compared with Caucasians. It would appear that so far as these diseases are concerned inherent physical characteristics or racial habits must exert a specific predisposing influence. The excessive mortality from acute respiratory diseases and from external diseases which appear among the Chinese in the coast States are, on the other hand, apparently due to local climatic or social and environmental conditions or to the particular type of Chinese represented in the United States, since death rates from these causes are not excessive in Hawaii or in Manila."

SIAM. **Report of the Department of Public Health** [H.R.H. The Prince of Jainad, Director-General]. **Including the Report of the Office of the Medical Officer of Health, Bangkok.** [MENDELSON (R. W.), M.O.H., Bangkok.]-1922. (B.E. 2465.) Nov. pp. vi+169. With 14 diagrams & 57 tables.

In a recent number of the Sanitation Supplements it was stated that the Siamese Red Cross Society took the place of the Government Public Health organization of other countries. This is not correct; although it is true that the Red Cross Society, in conjunction with the International Health Board, started and maintained a hookworm survey and has assisted the Health Department very materially in many ways, it is none the less a fact that there is a highly organized public health service, the Annual Report of which we have recently received.\*

In Chapter 6 of this volume is given a detailed account of the Organization. It comprises a Director-General, a Director, Secretaries, a health education department, an engineering section, and several physicians and Government doctors scattered over the country. Some of these fulfil the double duty of attention to the sick and to public health works.

The hookworm survey before mentioned has now been handed over to the Department of Public Health. The arrangements of the Department seem to be extremely up to date; there are not many countries in the East that, to save time in an emergency, deliver their vaccine lymph by aeroplane. This has occurred in Siam.

As regards statistics, there is apparently much yet to be done in the way of correct collection and tabulation. The infant mortality is put down as about 300 per 1,000 children born, due, the writer says, to ignorance and lack of suitable care of infants. It would appear also that a very large number of women die in childbirth, owing to the same causes and a deficiency in trained midwives. A disease known as "sang," which appears, from the scanty description given, closely to resemble infantile liver, common in some parts of India, accounts for a very large number of deaths amongst babies.

Smallpox is fairly common in the country and occurs periodically every 3 or 4 years, in the months of December, January and February. It is, however, greatly reduced compared with former times, owing to vaccination; there is a laboratory for vaccine manufacture. The writer says that the aim should be to vaccinate one million people per annum. At present, in the most favourable year, they have succeeded in doing half a million, but recently it was about 200,000.

As regard plague, the difficulties are those described in the Dutch East Indies, namely, that bamboos become the nests of rats and the grain markets are highly infested with these pests. *Xenopsylla cheopis* is common on rats.

Of cholera in the year under report there were 18,000 cases, with 13,000 deaths. Such data as are available point to river and canals as the greatest source of danger. Pollution of these by latrines on the banks is frequent. Amoebic dysentery and hookworm are both very common diseases; figures are not given. Malaria is one of the most important causes of death; Government facilitates the distribution

\* H.R.H. the Prince of Jainad, Director-General of the Department of Public Health, writes: "Although the Red Cross Society has given material aid in the public health of this country, the Department of Public Health differs in no essential principle from similar Government organizations in other countries."

of quinine during severe outbreaks. Blackwater fever is not prevalent but occurs occasionally in the North Division. 80,000 deaths from influenza took place in 1918; business was at a standstill; schools and Government offices had to be closed.

As regards the Medical service of the country. "There are in Siam approximately 500 physicians who have passed an examination recognized by the state, and received certificates to that effect, and hence may be classified as qualified. Of these there are approximately 50 who have been scientifically trained in accordance with European standards. If we estimate the total number of persons practising the art of healing in one form or another to be approximately 10,000, that is 1 per 1,000 of the population, a very conservative estimate, it will be seen the proportion of qualified men to unqualified, and also comparative to the total requirements of the Kingdom, is practically negligible."

SISON (Agerico B. M.). [In English & Spanish.] **Causes of Death in the Medical Wards of the Philippine General Hospital. A Comparative Study.** *Las causas de muerte en las salas de medicina en el hospital general de Filipinas. Un estudio comparativo.*—*Jl. Philippine Islands Med. Assoc.* 1924. Mar. Vol. 4. No. 3. In English pp. 87–89. In Spanish pp. 111–112. [3 refs.]

This paper contains an account of the causes of death amongst the patients of the Philippine General Hospital. They are tabled below. The chief feature is the extraordinarily large percentage of mortality for typhoid fever :—

	1920.	1921.	1922.
Typhoid fever ... ..	50	36	58
Lobar pneumonia ... ..	29	19	17
Nephritis ... ..	17	16	11
Cardiac decompensation ... ..	23	6	21
Meningitis ... ..	13	13	4
Tuberculosis ... ..	14	10	10
Cerebral hemorrhage ... ..	11	14	7
Bronchopneumonia ... ..	10	6	6
Encephalitis ... ..	—	—	6

Comparison by Percentage.

	1920.	1921.	1922.
Total typhoid cases ... ..	118	210	226
Deaths due to typhoid ... ..	50	36	58
Total number of deaths ... ..	184	151	164
Typhoid mortality per cent. ... ..	23·8	30·5	25·59
Typhoid mortality as compared to the total number of deaths ... ..	27·12	23·8	35·4

MEDEDEELINGEN VAN DEN BURGERLIJKEN GENEESKUNDIGEN DIENST IN NEDERLANDSCH-INDIË. 1923. Part 4. pp. 327–455. With 5 charts.—**Annual Report of the Civil Medical Service for the Year 1921.**

*Vital Statistics.*

*Causes of death, most prevalent diseases. Europeans.*—"Diseases of the respiratory organs (not including tuberculosis) and diseases of the digestive organs (dysentery not included) stand easily at the top of the list as a cause of death.

" Malaria takes, as such, a second place, except in Semarang, where the mortality due to this disease is very considerable.

" Typhus abdominalis stands at about the same height as malaria : this is much too high. Contrary to assertions more than once proclaimed formerly, tuberculosis assumes an important place amongst the cause of death.

" Cancer also participates to a considerable extent. It might serve as a comparison to state that, in a similar statistical compilation for Holland, which appeared in Saltet's "*Voordrachten over Gezondheidsleer*," and which extended over the years 1907 to 1918 inclusive, tuberculosis is shewn as 11·7 and cancer as 7·6." [Here tuberculosis is 7·7 to 8·7 ; cancer 3·4 to 5·2.]

*Laboratory work (Chemistry).*—" The investigation into Korintji rice shewed that the vitamin-content of this rice which had been stored up for more than 100 years had not diminished to any important degree."

*Prophylactic vaccine.*—" Owing to the fact that in 1 c.c. of mixed cholera-typhoid-vaccine there are present just as many cholera and typhoid germs as in 1 c.c. cholera vaccine plus 1 c.c. typhoid vaccine, it appears that in 1921 the total vaccine, equal to the usual cholera vaccine, that was dispatched amounted to a total of 842,089 c.c. cholera vaccine." The amount of mixed vaccine issued was sufficient for 249,973 people."

*Cholera.*—" Cholera did practically not appear in the Archipelago during the year under review."

*Smallpox.*—" Gradually but regularly the number of cases of smallpox is decreasing in the Archipelago."

*Plague.*—" The total number of victims amounted to 9,727 (among which 520 cases of pneumonic plague). Of this number 1,987 died in the division of Salatiga, 2,912 in Magelang, 2,735 in Bojolali, with 225, 186 and 81 cases of pneumonic plague. In the division of Pasuruan of the 103 cases 69 were pneumonic plague. At the present moment the centres of the plague are principally found in the highlands of the three divisions first mentioned. From Salatiga outwards the disease shews an inclination to spread out in the direction of Pelantungan (division of Kendal) and Bawang (division of Batang)."

*Typhus abdominalis.*—" The number of cases reported in Java and Madura amounted to 937, with 160 deaths, giving a mortality of 17·1 per cent."

*Influenza.*—" Influenza still continues to claim its victims, almost everywhere in the Archipelago, and here and there it even appeared in serious epidemics, as in the 2nd quarter in the district of Tasikmalaya, with 2,282 cases with 350 deaths, mortality 15·8 per cent., and in one village even as high as 35·1 per cent."

*Framboesia.*—" A systematic extension of the campaign against framboesia amongst the population was carried out in the course of the year throughout almost the whole of the Archipelago. . . .

" The total number of people treated can certainly be estimated at from 250,000 to 300,000, when we take into consideration the fact that in the medical departments of West Java and Mid Java 60,000 and 133,500 people were treated, and in the Government of Celebes

39,914. The principle of payment, wherever possible, for the remedy, was kept up everywhere. In this way it was made possible at the same time to provide this inestimable treatment for the population, without any extra cost worthy of the name."

*Malaria.* "In 1919 the irrigation ordinance was introduced into the Tjihea plain; from that time forward the plain was divided into two halves, which were provided with water about 6 months each in turn and then allowed to lie dry. Before an area was supplied with water, all the tertiary water channels were renewed and cleaned, so that from the very commencement *M. aconita* had no opportunity to lodge themselves in the ditches. During the planting of rice the tertiary channels are continuously kept clean. The Tjihea plain is now not only more healthy, but has also become more productive and available for dry planting (second crop), which up till then was not the case."

*Amoebic dysentery, bacillary dysentery.*—"The making of simple, efficient, latrines by means of boreholes in the ground was continued in various places in the medical department of West Java."

QUEENSLAND. **Annual Report of the Commissioner of Public Health to 30th June, 1922.** [MOORE (J. I.), Commissioner of Public Health.]—24 pp. 1922. Brisbane: Anthony James Cumming, Govt. Printer. [Price 9d.]

Estimated population (1921) 764,665; crude birth rate 26·59; death rate 9·34; infantile mortality 54·1 per 1,000 births.

*Plague.*—"The number of cases in humans in the Metropolitan Area amounted to 57, of which 28 proved fatal, whilst from outside centres 57 cases were reported with 36 deaths, making a total throughout the State of 114 cases and 64 deaths.

"The death rate in Brisbane was 49·12 per cent., but as three cases occurred amongst Chinese, who all succumbed, the corrected rate for whites is therefore 46·29 per cent. The death rate outside of the Metropolitan area was 63·1 per cent."

The majority of cases occurred in the months of October-December, but a few cases were reported in August, September, January and March. Infection is attributed to ship rats, but whether from Australia or outside is a matter of conjecture. The first infected rat was caught on 31st August; subsequently 116,476 rodents were destroyed, of which 109,798 were examined and 186 found infected.

Sentinel guineapigs were placed in 56 premises from which infected rats had been captured; altogether 10 of these—from 5 several premises—died of plague. The fleas collected from 57 rats and 6 sentinel guineapigs were 176 *Xenopsylla cheopis*, 6 *Ctenocephalus felis*, 8 *C. canis*, and 1 *Ceratophyllus fasciatus*.

*Typhoid.*—"There may be mentioned one interesting series of cases which occurred in the Brisbane General Hospital amongst the staff of the hospital. Two medical men and four nurses contracted the disease whilst nursing surgical cases. It was found on investigation that two male surgical cases under treatment for surgical conditions were typhoid carriers and caused the outbreak. These two patients subsequently gave negative results, and no further cases amongst the staff occurred."



PANAMA CANAL ZONE. **Report of the Health Department of the Panama Canal for the Calendar Year 1922.** [FISHER (H. C.), Chief Health Officer.]—120 pp. With 7 plates & 6 charts. 1923. Mount Hope, C.Z.: The Panama Canal Press.

*Vital Statistics.*

*Employees.*—"The 5 diseases causing the highest number of hospital admissions, with their rates, were as follows:—

	1921.		1922.	
	Admis- sions.	Rate.	Admis- sions.	Rate.
Venereal Diseases ... ..	310	21.54	191	18.28
Malaria ... ..	214	14.94	176	16.85
Diseases of the eyes and their annexa	104	7.23	60	5.74
Tuberculosis (various organs) ...	38	2.64	34	3.25
Nephritis (chronic and acute) ...	25	1.74	28	2.68

"The 5 diseases causing the highest number of deaths, with their rates, were as follows:—

	1921.		1922.	
	Deaths.	Rate.	Deaths.	Rate.
Tuberculosis (various organs) ...	11	0.76	12	1.15
Organic diseases of the heart ...	14	.97	9	.86
Cerebral hemorrhage (apoplexy) ...	6	.42	6	.57
Cancer (various organs) ...	4	.28	6	.57
Nephritis (acute and chronic) ...	9	.63	4	.38

*Sanitation.*—"A large increase in the number of cases of malaria among non-employees is shown, and this was expected and predicted as

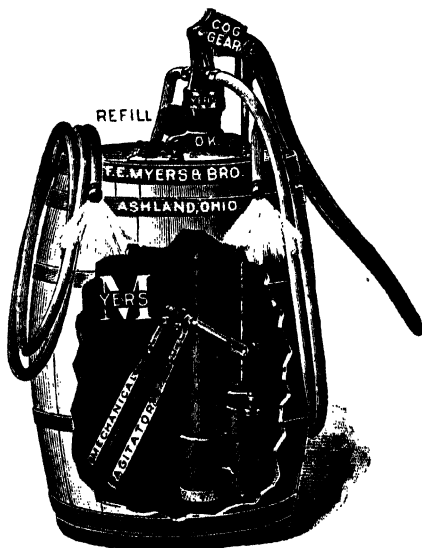


FIG. 64.—Barrel pump used for spraying heated oil from boat. The heated oil makes a fine misty spray which films well, even among the vegetation, when it falls upon the water.

[Reproduced from the *Report of the Health Department of the Panama Canal for 1922.*]

a result of the new policy of allowing unemployed labourers to return to the Zone to take up land for agricultural purposes. As explained in last year's report, it is impracticable to attempt to sanitise the country in which these settlers live. They are widely scattered over the available parts of the Zone, living in rude shacks near water courses and the lake, and are at all times exposed to malarial infection. About

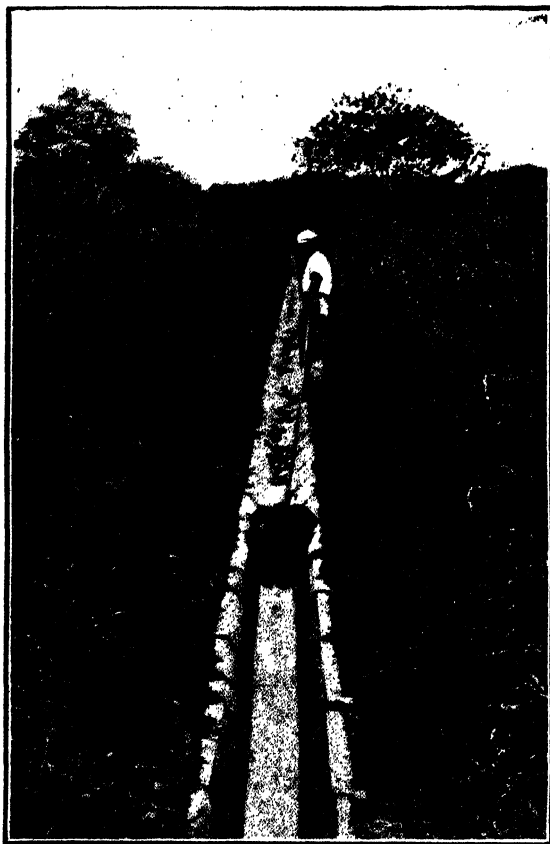


FIG. 65.—Oil-soaked mop, made from strands of old rope, dragged through open ditches, earthen or concrete, sweeps out small debris and algae, dislodges mosquito larvae, and leaves a good film of oil on the water.

[Reproduced from the *Report of the Health Department of the Panama Canal for 1922.*]

1,500 licenses have been granted these settlers, and it is estimated that 650 families are now living on the land. Each home inspected has been found to have a pit privy, not covered nor water-tight, but at least limiting the chances of intestinal infection. Many have learned to boil their drinking water and a few are undertaking drainage. Aside from malarial infection, the venture seems surprisingly successful in most instances. Ground has been cleared rapidly, and already many

of the settlers have achieved what appears to be economic independence, at least of their standards, and are rearing their families in contentment. They will be, perhaps, in better circumstances than similar agriculturists in Panamanian territory. . . .

"Screening, though expensive, is still a vital element of defence against malaria in the Canal Zone. Even in Ancon and Balboa, which



FIG. 66.—Double-ended oiling mop, made from strands of old rope. In oiling a narrow ditch the mop is dragged with one end following the other. In wider ditches the ends lie side by side. In streams the mop is dragged up one side and down the other. It is very efficacious and is economical of oil and labour.

[Reproduced from the *Report of the Health Department of the Panama Canal for 1922.*]

are least exposed to anopheles flights, a dangerous condition would probably result if without screens during certain season of rainfall, from anopheles bred more than a mile away. . . .

"The preliminary heating of oil to facilitate its passage through the piping and nozzles of spray pumps, without the use of 'larvacide' or

other diluting substance, has thoroughly demonstrated its practicability and economy. A particularly efficient type of pump has contributed much to its success. The one used is strongly constructed of cast iron, with brass plunger and valves. A geared handle and an ample air chamber in the stand permit of easy operation and a continuous fine spray of oil. [Fig. 64.] The drag or mop, made of strands of rope, used in cleaning and oiling open earth and concrete ditches, has also, after extended use, proven efficacious and saves greatly in time, labour, oil and cost. Earthen ditches so oiled require less frequent cleaning of vegetation from the sides and bottom. In fact, a certain amount of growth seems to add to its effectiveness, as the oil is retained on the stalks and leaves, to be given off as an effective film for some days following its application. [Figs. 65 and 66.]

GONZAGA (Gavião). **O problema das endemias rurais no Ceará.**—*Brazil Medico.* 1924. June 21. Year 38. Vol. 1. No. 25. pp. 352-357.

The State of Ceará is divisible into three distinct zones:—(1) Littoral, cool and moist, with a mean temperature of 26°C. and a relative humidity of 77 per cent.; (2) Hilly, with a mean temperature of 20.7°C. and a relative humidity 85 per cent.; Inland, dry and hot, with a mean temperature of 27.6°C. and relative humidity 63 per cent. The prevailing diseases are trachoma, yaws, tuberculosis, leprosy, malaria, syphilis and plague. Ocular affections, of which trachoma is the chief, are common and are probably spread by the enormous numbers of flies infesting those with sore eyes. Yaws is prevalent in various localities, some showing 25 per cent., others as high an incidence as 80 per cent. The main focus of tuberculosis is Fortaleza, whence the disease is said to have spread to all the towns in the interior. Yellow fever first appeared in 1851, also in Fortaleza, and during the ensuing 25 years epidemics were frequent in different districts. For the next 30 years there was a lull, but in 1907 the disease reappeared in Quixadá. Notification was not carried out till 1922, so that reliable statistics are not available, and in 1923 the Rockefeller Foundation took matters in hand. The first case of leprosy was notified in 1868; recently in the Department of Leprosy and Venereal Diseases there have been recorded 140 cases in the capital and 250 in the various towns in the interior of the State. Plague is not a great scourge. Helminthiasis, in particular ankylostomiasis, is not regarded as an important sanitary problem, although the incidence varies from 32 per cent. in the inland to 54 per cent. in the hilly districts. Syphilis is rife and treatment is not thorough, because of the fear of injections, the cost, and because the patients cease attendance before cure is complete. Sanitary problems are not easy of solution in Ceará, on account of the large number of small foci of disease, the poverty and want of education of the majority of the inhabitants, and because means of communication are bad.\*

UNITED FRUIT COMPANY. **Medical Department. Twelfth Annual Report. 1923.** [DEEKS (William E.), General Manager.]—180 pp. With 1 map. 1924. Boston, Massachusetts: General Offices.

The annual medical report of the United Fruit Co. in America for the year 1923 is, as usual, an extremely interesting and important

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\* Summarized by Dr. H. Harold Scott.

document. The summary of the work done, which is given below, affords some idea of the activities covered by this Company.

"As will be seen in the Table of Vital Statistics—

28,398 cases were treated in the hospitals.

227,545 treatments were given in the dispensaries.

10,170 cases were treated on the steam ships.

4,282 cases were treated by the Port Medical Officers.

1,406 candidates were examined for employment, of whom 99 were rejected.

100 steam ships were fumigated throughout, and, in addition, the holds of 3 steam ships and 51 separate rooms or quarters."

The average case incidence of the last four years is given below per 1,000 of the population. Malaria worked out at 20.5 per 1,000 employees, death rate at 2.1 per 1,000 employees, and 10 deaths per 1,000 cases.

Average 1920-1923.			Hospital cases per 1,000 Employees.	Deaths per 1,000 Employees.	Deaths per 1,000 cases.
Anchyllostomiasis	...	...	23.60	.022	.9
Dysentery	...	...	13.6	.99	73
Influenza	...	...	15.3	.40	26.0
Pneumonia	...	...	11.20	4.59	408
Tuberculosis	...	...	5.92	1.77	299

No. of Employees.	No. of cases.	Deaths.	Deaths per 100 cases.	Deaths per 1,000 Employees.	Cases per 1,000 Employees.
44,625	21,642	706	3.26	15.82	484.97

There is a good deal of very interesting matter concerning treatment in various parts of the world which we regret that space prevents us from describing in detail.

"It is noteworthy that the rates of morbidity and mortality from the various diseases during 1923 approximated very closely the morbidity and mortality rates observed during the period covering the preceding nine years.

"Pneumonia was responsible for 22 per cent. of the deaths during 1923, and 20 per cent. of the deaths during the preceding nine-year period.

"Malaria also played an important rôle in the mortality rate; it was responsible for 13 or 14 per cent. of the deaths during each period.

"Tuberculosis caused 9 per cent. of the deaths in each period.

"Dysentery was responsible for more than 7 per cent. of the deaths in 1923, and approximately 4 per cent. of the deaths during the nine-year period. The exceptionally high rate in 1923 is explained elsewhere in this report.

"Organic diseases of the heart caused 5 per cent. of the deaths in each period.

"Nephritis caused more than 5 per cent. of the deaths in 1923, and more than 7 per cent. in the nine-year period.

"External causes were responsible for 7 or 8 per cent. of the deaths in each period."

**PALESTINE. Annual Report of the Department of Health for the Year 1922.**—89 pp. [MS. Report.]

Census returns from October 1922, 649,048 (the corrected figure).

Birth rate, 42·39 per 1,000 of the population.

Death rate, 18·75 per 1,000 of the population.

Infant mortality, 205 per 1,000 children born in the towns and 135 in the districts.

**Infectious Diseases.**—

Rabies is fairly common in the country ; 423 patients were treated with vaccine for bites of animals.

A small epidemic of plague (63 cases with 19 deaths) broke out in July, and continued in August, September and October, dead rats being observed in an unsanitary part of the town.

Smallpox, 158 cases with 16 deaths, occurred in the month of December ; 207,289 vaccinations and re-vaccinations were carried out throughout the country as a whole.

26 cases of typhus fever occurred in the town of Jaffa, which was probably infected through immigrants from Eastern Europe.

25 cases of relapsing fever were noticed, 5 of which occurred in Jaffa and 8 in Haifa.

208 cases of typhoid, with 32 deaths, were reported throughout the country, October being the month when it was most prevalent ; 63 cases of paratyphoid were also reported.

129 cases of dysentery were notified, mostly from the towns.

No cholera, dengue, filariasis, beriberi or leishmaniasis were reported during the year.

A large amount of work was done in the laboratory. Some 3,000 slides were examined for malaria parasites. The results have shown that speaking generally the incidence of the benign tertian form reaches its maximum in August, its minimum in January ; that of the malignant tertian form its maximum in October-November and minimum in March. 61 cases of quartan have been diagnosed ; 24 originated in the Tiberias area.

**MISCELLANEOUS.**

**SPILLANE (J. C.). Memorandum on the Centralisation of Estate Hospitals in Sumatra.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1924. June 19. Vol. 18. No. 3. pp. 117-120.

It is well known to many Medical Officers in the tropics that in Sumatra and the Dutch East Indies there is a most excellent system of medical arrangements for the labour on Rubber Estates. The writer in an extremely interesting paper describes these in some detail. He points out the great improvement that has taken place within the last 30 years. Hospitals are divided in 3 classes :—

"1. *Private.*—That is, companies employing 10,000 or more coolies have one or more central hospitals of their own.

"2. *Syndical*.—A group of smaller companies, aggregating 10,000 coolies, have a central hospital, on the committee of which all estates are represented.

"3. *Contributory*.—The hospital is built by private funds, and surrounding estates contribute so much for the services of the doctor and so much per day for each coolie in hospital.

"Combinations of 1 and 3, also 2 and 3 occur."

As regards working details, the economical unit is 10,000 coolies and 100 to 150 Europeans. Every indentured coolie is very carefully looked over at a specially constructed sort of quarantine arrival station, is weighed, treated for any disease that he may have, and is inoculated against typhoid and cholera. Patients admitted to hospital are very carefully examined and a record of weight, anæmia, new infections, etc., is made. Disease is localized by showing the gang in which the coolies work and the barrack from which they come by the use of coloured flags on a map. At the end of each month a report is issued giving the following points:—

"(a) The sick rate per cent.; (b) mortality; (c) number of sick days in relation to working days; (d) infant mortality; (e) prevalence of special diseases affecting the health of the estate; (f) cost of upkeep per coolie per day."

Monthly visits of a sanitary officer to European residences and the barracks are also a feature of the scheme. Minor ailments and small accidents are treated at local dressing stations; no patient is allowed to be sick longer than 2 days at these places. There is also welfare work amongst the women and children and maternity wards, etc.

"The working costs of such a hospital—serving 10,000 to 11,000 coolies and their families; including the doctor and his transport; one European assistant (non-qualified) for the books, records and administrative work; medicines; wages of sixteen to eighteen native assistants; hospital clothing and feeding; small repairs and renewals; contribution to central laboratory, insurance and telephones—is 60,000 guilders, or \$43,000.00: a little over \$4.00 per coolie per annum. Under this estimate a liberal allowance is made for everything for a normal sick rate, and with economy it could be less, certainly not more. Under this estimate is included the upkeep of a small European hospital with male and female wards. Europeans pay for their own maintenance while in hospital \$5.00 a day."

APPLETON (V. B.). **The Health Center Movement in China.**—*Nat. Med. J. China*. 1923. Dec. Vol. 9. No. 4. pp. 284–286.

The writer gives a description of what is commonly known as the "health centre movement in China." The Health Centre as constituted in China appears to be an institution which combines the uses of a propaganda centre and an infant and maternity and child welfare centre. Patients are not treated, so that it is hardly correct to describe it as a dispensary. Vaccination is carried out by the Officer in Charge and everything connected with improvement of the public health receives a large amount of attention. Periodical examination takes place of the children of the district; mothers are instructed in feeding of their babies, etc. It is hoped to employ special nurses to follow up

in the home the work started at the clinic. The so-called waiting room is really nothing more nor less than an exhibition. The method of teaching avoids lectures as far as possible and makes use of demonstrations and conversations with the patients while they are waiting.

WANG (K. Chimin). **Some Experiences in Public Health Work at Hangchow.**—*Nat. Med. Jl. China*. 1924. Apr. Vol. 10. No. 2. pp. 80-88.

This paper contains an account of the difficulties of health work in China, which, however, do not differ very much from many other parts of the East. Thus the Celestial does not approve of killing dogs, rats and fleas, any more than the Buddhists in Ceylon and parts of India. The author indicates the extreme importance of the dog problem in many parts of China. Dogs not infrequently contract rabies and have been known to attack adults and children. As the writer says, one can ill-treat them, starve them and even torture them, but may not rid a community of their unwelcome presence.

Among methods recommended by the writer are anti-fly campaigns, which are certainly novel. The small children are provided with swatters and the dead flies are paid for at so much a hundred. Even this arrangement was stopped by religious prejudices. Other methods of propaganda were baby campaigns, mothers' clubs, child welfare clinics, school health work, and exhibitions.

DUNN (C. N.). **The Provision of Whole Time District Health Personnel in the United Provinces.**—*Indian Med. Gaz.* 1924. June. Vol. 59. No. 6. pp. 310-312.

The writer gives in very great detail an account of the conditions of service of three permanent Health Officers in the district of Gorakpur, Basti and Azamgarh, in the United Provinces. The duties of these officers are similar to those of Health Officers all over the world. They are termed District Medical Officers, and are paid at the rate of Rs. 350-50-700; for a second class officer the pay is Rs. 200-20-400; for a Sanitary Inspector Rs. 70-3-100. (It may, however, be pointed out that Government pay two-thirds of the cost and the District Board the remaining one-third.) All these districts are very populous and are frequently attacked with cholera and plague.

The staff at present is as follows :—

"(a) Gorakpur District. (Six tahsils).—Two district medical officers of health, with a staff of two assistant district medical officers, five sanitary inspectors, two clerks, four peons, travelling allowances and contingencies—Rs. 27,708 per annum.

"(b) Basti district. (Five tahsils).—One district medical officer of health, with a staff of one assistant district medical officer, three sanitary inspectors, one clerk and three peons, with travelling allowances, contingencies, etc.—Rs. 18,000 per annum.

"(c) Azamgarh District. (Six tahsils).—One district medical officer of health, with a staff of one assistant district medical officer, six sanitary inspectors, one clerk, two peons, with travelling allowances, contingencies, etc.—Rs. 17,514 per annum."



**PHILIPPINE ISLANDS** [In English and Spanish.] **Items of Information regarding the Office of the Public Welfare Commissioner.**—10 pp. With 2 plates of illustrations. Manila: 700 Avenida Rizal.

The Public Welfare Commissioner of the Philippines has published a small pamphlet dealing with the activities of his office in relation to the general welfare of the community, and more particularly to maternity hygiene and child welfare, in the Philippine Islands. The office consists of (1) a Maternity and Child Welfare Division, concerned with the organization and working of maternity and puericulture centres, training of nurses and midwives, etc.; (2) a Dependent Children Division, charged with the care and education of orphaned and needy children and of defective and delinquent children; (3) a General Welfare Division, which promotes the public welfare by propaganda, by the study of community problems, and by co-ordinating, regulating, and assisting Government and private social service agencies; and (4) an Administrative Division, which concerns itself with disbursements, control of properties, the collection and distribution of supplies, etc., and supervises the accounts of charitable organizations in receipt of Government aid. The total personnel in 1922 was 157, and the cost of the office was p. 620,682.90 representing a per capita cost of .0549.\*

**LEVINE (Max) & LINTON (Clair S.). Differentiation of Human and Soil Strains of the Aerogenes Section of the Colon Group.**—*Amer. Jl. Public Health.* 1924. Feb. Vol. 14. No. 2. pp. 95-99. With 2 figs. [6 refs.]

Summary.

"A collection of 123 cultures of the aerogenes section of the colon group, comprising 47 strains isolated from human dejecta, and 76 strains from soil, were studied as to their morphological, cultural and biochemical characters.

"Two distinct types were evident when sub-division was made on glycerol fermentation, motility or gelatin liquefaction: (1) a group which is considered as the cloacae type (comprising 36 strains) did not ferment glycerol, was actively motile, and practically always liquefied gelatin; other carbohydrates (particularly the alcohols) were very rarely attacked; (2) a group which is representative of the aerogenes type of organism (comprising 78 strains) which attacked glycerol vigorously, did not liquefy gelatin, and was non-motile; other carbohydrates were frequently attacked. Besides these two main types, 9 cultures, which were intermediate in their characters, but which may be mixtures rather than a distinct type, were encountered.

"Adonitol non-fermenting strains of the aerogenes type were found only in the soil.

"Of the adonitol positive strains of the aerogenes type, which included 23 from soil and 44 from human sources, the soil and human strains could be differentiated in all but 3 instances on the following characters: melezitose, inulin, glycogen and dulcitol fermentation, and the production of indol.

"In the cloacae group, 4 strains of soil origin did not ferment sucrose, thereby resembling *B. levans*. In the remaining 32 strains there are included 3 of human origin which differed from the others in their more rapid fermentation of lactose and the appearance of their colonies on eosine methylene blue agar."

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\* One Philippine peso = 50 cents U.S. currency.

## REVIEWS AND NOTICES.

NEWSHOLME (Arthur). [K.C.B., M.D., F.R.C.P. Formerly Principal Medical Officer, Local Government Board, London; Lecturer on Public Health Administration at the School of Hygiene & Public Health, Johns Hopkins University, U.S.A.] **Elements of Vital Statistics in their Bearing on Social and Public Health Problems.**—623 pp. With 96 text figs. New Edition. Entirely rewritten. London: George Allen & Unwin, Ltd. Ruskin House, 40 Museum Street, W.C. [Price 24s. net.]

The study of vital statistics in its broadest sense is the daily occupation of all those who have an interest in the welfare of their fellow creatures. It is only when the subject is treated in a systematic and scientific manner, involving tables of figures which are difficult to interpret, and curves which may be hard to understand, that the ordinary individual shrinks from it. The fault may lie in the method of presentation, or it may be due to the terrifying amount of material which has to be dealt with. The science, however, is clear in itself, and it should be the endeavour at any rate of every medical man to master it. The conception of time as a flowing stream, into which lives are born, which, after a brief passage, are again cast out of the current, is one which has appealed to man throughout the ages. It appears in the earliest literature, it finds a place in the most modern philosophy. It is more than an analogy, it is a mode of thought.

The problem may be approached in a general manner, on what one may call hydro-dynamical lines, that is to say one may study the general behaviour of the stream as it flows. On the other hand, it may be attacked in a detailed, or, let us say, a geographical manner, when one devotes one's attention to those influences which affect the stream or are affected by it. The general or hydro-dynamical study requires a considerable degree of mathematical knowledge, and is usually left to the actuary. The detailed or geographical study, in this country at least, is usually confined to Health Officers, and biometricians. It is unfortunate that this is so—for the study of the health and welfare of people should be the special province of those who by their medical education are peculiarly suited for it. In this respect the medical man of the tropics is far in advance of his brother at home.

The general point of view of the actuary should not be neglected. His problems bristle with interest. He deals with the chances of death at the various ages, that is to say with the variations in number of individuals, born at the same time, and living under constant conditions of environment, during their course down the stream. He deals with the age proportions; that is to say with the relative numbers at each age which pass some specified point on the bank of the stream. He examines these in populations under constant conditions of environment, and contrasts them in different races. He enlarges his study to observe and interpret the further variations which take place as external conditions vary. He may even find evidences of whirlpools or vortices in the stream, as, for example, when he investigates the correlation between health and wealth.

On the other hand, and even more so, we cannot afford to neglect the detailed or geographical study which deals with the reality and significance of less general variations. We should have exact information regarding the relative importance of different diseases. We should know whether they are on the increase or decrease. We should know whether particular occupations, or conditions of environment, have a significant influence on particular diseases, and in what manner and degree they influence them. Our distant objective is the amelioration of adverse conditions, but we must first convince ourselves with scientific accuracy that they are in truth adverse. We must know, further, that their removal is likely to result in a significant improvement, and that the cost of their removal is justified.

Take, for example, such questions as the effect of overcrowding; its influence on general health; upon the rate of transmission of communicable diseases. Or again, the effects of alcohol consumption upon a population: as it affects general health, susceptibility to disease, the prevalence of venereal disease, of accident, suicide and homicide; its influence upon the birth-rate, legitimate and illegitimate; its relation to overcrowding and poverty.

Sir Arthur Newsholme, in his *Elements of Vital Statistics*, deals with questions such as these, and in his new edition has furnished us with the ripe fruit of many years of experience and study. Apart from the last hundred pages, which relate to methods, the book contains no mathematics. This will be a regret to some, and a relief to others. With a severity of scientific restraint, which will commend itself to all, he discusses the basal facts out of which arise the social problems, not only of our own, but of all nations. His chapter on alcoholism in relation to the public health is a restrained and reasoned analysis of facts, which lead inexorably to a conclusive verdict. The same may be said with regard to his chapter on Housing statistics. This useful volume should be the *vade mecum* of all who are interested in problems of health as they relate to people in the mass. It should be read by every social reformer, be he layman or medical. It will be of special value to those who are responsible for the virgin populations of tropical countries.

A. G. McKendrick.

**INDIA. Census of India. 1921. Vol. 1. Part 1.—Report.** [MARTEN (J. T.), M.A., I.C.S.]—pp. xii+293+xxvi. With numerous maps and charts. 1924. Calcutta: Supt., Govt. Printing. [Price Rs. 4 As. 12, or 6s. 4d.]

— **Part II.—Tables.** pp. ii+351. 1923. Calcutta. [Price Rs. 9 As. 4, or 12s. 4d.]

The territory included in this census lies between long. 61° to 101°E. and lat. 8° to 37°N., and comprehends Baluchistan and Burma, besides India proper and the native Indian States. The few appropriate items here selected from the Report of the census relate exclusively to British India, which does not include the native Indian States.

The area of British India is 1,094,300 square miles; its population numbers 247,003,293, the average density of the population per square mile varying from over 1,000 in certain parts of Eastern Bengal to 6 or 7 in Baluchistan.

Vital statistics, to which our concern is restricted, are recorded in all but the rudest and remotest tracts. The raw material is collected in rural areas by the village headman, who communicates it to the nearest police station, where it is registered; in towns the registration is done under municipal authority. Statistics so based cannot have a very high value, even were all village headmen and municipal clerks as handsome in all their doings as Dogberry, and as honest as Verges. The village headman may perhaps recognize plague and cholera and smallpox during established epidemics, but pretty well everything else is "fever." Even in records of birth and deaths, omissions are believed to range up to 20 per cent. in rural areas, and even higher still in municipalities. But though the statistics have little absolute value they are collected under the same conditions from year to year, and maintain the same calibre for domestic comparison.

The total death-rate for British India is between 30 and 31 per mille; and the infantile death-rate amounts to about one-fifth of it. In the present decade the infantile mortality per thousand children born alive averaged—excluding the year of the influenza epidemic—211 males and

199 females, and in the year of that epidemic was 274 males and 260 females. Over 40 per cent. of the deaths of infants occur in the first week and over 60 per cent. in the first month after birth.

During this decade the calamity that exercised the most disastrous effect upon the public health was the influenza epidemic of 1918-19. Apart from indirect and remote effects, the recorded mortality from the disease was  $8\frac{1}{2}$  millions, which unfortunately can only be regarded "as a substantial underestimate" of the total. What the mortality really was can never be known, but it is here stated that in a few months the epidemic blotted out the whole amount of the natural increase in population for the previous seven years.

The number of deaths from plague was less than half that of the previous decade (when the recorded deaths numbered  $6\frac{1}{2}$  millions).

As usual, by far the largest number of deaths are recorded as "Fever." Formerly about two-thirds of these deaths were assumed to be due to malarial fevers; but although in the present decade epidemic malaria has been specially severe in the Punjab and United Provinces, and although the population in certain parts of Lower Bengal is said to be sodden with malaria, not more than one-fifth to one-fourth of the "fever" deaths are now attributed to the malaria parasite. In the last few years Relapsing Fever has been recognized as prevalent, especially in Northern India, the Central Provinces and Berar, and in Bombay, but its extent cannot at present be estimated. The same thing may be said of Phthisis, which is undoubtedly responsible for a considerable mortality, particularly in the towns of Western India.

The total death-rate from Cholera for the decade did not amount to more than 1.5 per cent. [? mille].

Of the census of "Infirmities" (which include insanity, deaf-mutism, total blindness, and leprosy) it is admitted that there are few headings in which trustworthy figures are more difficult to obtain. At the present census 33 per 100,000 males and 22 per 100,000 females were returned as insane, the largest number being in Burma and the fewest in Rajputana; but the criticism of an expert to whom the returns of the previous census were submitted is that they are incorrect and useless. The number of asylums is 23, and the total asylum population is 8,134 males and 2,023 females. (As regards deaf-mutism it is clearly stated that the returns are useless—that senile deafness has been included and that defective children have been ignored.)

The number of persons returned as totally blind is 152 in every 100,000 of population, the figure ranging from 319 in Baroda to 33 in Sikkim, being highest in hot arid sandy tracts.

The total number of lepers returned is 102,513, or 32 per 100,000 of population, the figure ranging from 74 in Burma to 4 in Rajputana. Dr. MUIR, however, of the Calcutta School of Tropical Medicine, thinks that the number should be multiplied by 10, justifying his opinion by the facts (1) that of 60 menial servants of the School examined by him, 5 were suffering from leprosy quite unawares, and (2) that on the day after the census was taken he found that only 2 out of 30 lepers attending his outpatient department had had their names entered on the census papers as lepers. The number of leper asylums is 89, and of inmates 8,090.

A. Alcock.

LEAGUE OF RED CROSS SOCIETIES. **Elements of Hygiene.**—Published with the Authorization of the Comité National de Défense contre la Tuberculose.—32 pp. Illustrated in four colours. Paris: 2, Avenue Velasquez.

The stated purpose of this little book is to put before the public some simple principles for the preservation of health and avoidance of disease, so that parents and teachers may duly impart them to the young. The matter includes maternity, infancy and childhood, with particular attention

to tuberculous infection in industrial life ; the dangers of tuberculosis, alcohol, flies, and polluted wells ; the sanitary duties of the general community, and the responsibilities of the department of public health ; and it is graphically presented in the form of broadside and poster combined. There are 29 of these illustrated (*more gallico*) broadsides, each conveying its particular lesson, usually of warning, but sometimes of hope. The open window and the open-air school are well in evidence, and most horribly salutary should be the pictures of the miscreant who spits upon the floor where his baby is playing, of the yahoos who cough and sneeze into inhabited space, of the well receiving the ample subsoil drainage of the adjacent cowshed and privy, and of the fly with diabolical leer exuding pestilential bombs upon a terror-stricken crowd below. An educated layman who has been asked for his opinion considers that the book is full of very good advice very *frankly* presented.\*

A. Alcock.

\* The pamphlet is available also in Spanish, French, Italian, Portuguese and Rumanian, and the League Secretariat is willing to re-issue it in any other language provided a minimum order for 5,000 copies is received.

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7.1. PUB.

# **SANITATION SUPPLEMENTS**

OF THE

# **TROPICAL DISEASES BULLETIN**

---

**APPLIED HYGIENE IN THE TROPICS.**

---

ISSUED UNDER THE DIRECTION  
OF THE HONORARY MANAGING  
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*General Editor :*  
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*Erratum.*

No. 1, 1925, p. 64, lines 9 and 10. The birth and death rate for Mauritius for the year 1923 should read 36·8 and 28·5 *per mille* respectively, instead of *per cent.*

## SANITATION SUPPLEMENTS

OF THE

## TROPICAL DISEASES BULLETIN.

## APPLIED HYGIENE IN THE TROPICS.

BY LT.-COLONEL W. WESLEY CLEMESHA, C.I.E., I.M.S. (retd.)

SUPPLEMENT No. 1.]

1925.

[MARCH 30.

## DISEASE PREVENTION.

DOORENBOS (W. B.). **The Sumatra System of Sanitation and Health Control on the Holland-American Plantations Company. (Kisaran, Asahan, Sumatra.)**—*Far Eastern Assoc. Trop. Med. Trans. Fifth Biennial Congress, Singapore, 1923.* pp. 74-93. With 16 figs.

From the point of view of the Medical Officer in charge of labour in the East this is one of the most important articles that have appeared.

It deals with the administration of medical relief on what is known as the Sumatra system of central hospitals on a group of estates. The total labour force is in the neighbourhood of 10,000, nearly 9,000 males and 1,000 women, with about 600 free labourers. We gather that most of the labour is indentured, and this renders the system easy of application. In places such as the Federated Malay States, where labour moves from place to place, the difficulties are naturally increased greatly. The estates have a manager for every 1,000 to 1,800 natives.

A diagram shows the general lay out of the lines. (Fig. 1.) Rubbish is incinerated. (Figs. 2 and 3.) Latrines of various kinds have been constructed, but it would appear that the trench latrine, 1 ft. broad, 3 ft. deep and 3 ft. long, covered with a small wooden house, has not been altogether a success. (Fig. 4.) The hand removal and bucket system combined with incineration have given better results. The ration is as follows:—

0.600 kg. ...	Rice.	0.040 kg. ...	Coconut oil.
0.015 kg. ...	Salt.	0.100 kg. ...	Dried fish.
0.150 kg. ...	Fresh vegetables.	one ...	Onion.
0.060 kg. ...	Green Peas.	two ...	Pepper pods.

Inspection of all the labour takes place twice in the year.

"The assistant manager calls the labourers one by one, who enter the tent and open their clothes, lying naked on the bench. The doctor

examines spleen, liver and eyes (for trachoma) and at the same time a head dresser opposite him controls venereal diseases, scabies and leg wounds. The labourer then leaves the tent and comes before two laboratory assistants, one of whom examines the haemoglobin with Tallquist and the other makes a thick blood smear for malaria examination. He then passes two men who administer hookworm medicine. (Fig. 5.) Formerly they received oil of chenopodium, 1.2 grm. (two capsules), and at the same time castor oil or salts. At present, however, one of the dressers puts some tea in a medicine glass and adds 3 cc. of carbon-tetrachloride, while the other dresser administers the dose to the man as he passes. Plenty of cold tea is available for the labourers to drink afterwards. Although thousands of doses have been given we have never had any trouble.

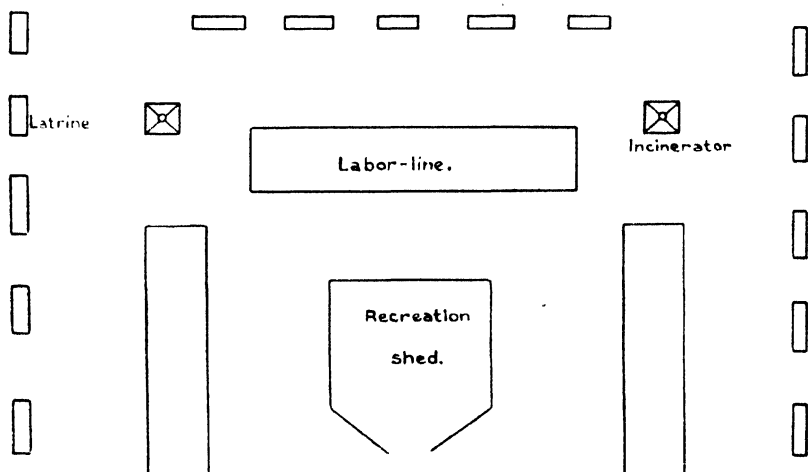


Fig. 1.—General lay-out of coolie lines on the Hollandsch-Amerikaansche Plantage Maatschappij. The lines are of wood with high roofs of atap or galvanized iron. The rooms are 9 ft. by 12 ft. in size, with cement floors, and a 5 ft. cement way with open cement drain running outside. Each room has a door and a wire-screened window (3 ft. by 3 ft.) with wooden shutter.

"After receiving the hookworm medicine the man passes behind the rows of waiting labourers and sits down in his former place. In this manner, one row after another passes and those not yet examined do not cross through those already examined.

"At a table near the tent a clerk records on the list received from the manager, after the name of the labourer, the size of the spleen, the haemoglobin content, the number of the slide, and everything found, such as leg wounds, eye diseases, scabies, venereal diseases, and if the man must be sent to the hospital. The assistant manager notes the treatments to be given on the estate, such as bandages for leg-wounds, anti-scabies medicine, medicine against trichophytia, and so on. When all have passed, the list thus made is checked to ensure that everyone has been examined."

Inspection of children is carried out by a lady, the wife of one of the assistant managers. Each child has his own index card. Much welfare work has been done amongst the women and young children.

"In the beginning there was some fear of these inspections, but



Fig. 2.—Incinerator in coolie lines, in charge of line-sweeper.



Fig. 3.—Incinerator and receptacles for refuse. The refuse is collected in covered barrels along the 5-ft. ways, and transferred to the incinerator each morning by the line-sweeper.

now the mothers appreciate more and more the value of this work. From August 1, 1922, to July 1, 1923, the average number of children was 2,156. During this period there died 221, or 10.2 per cent. ; 14 children were stillborn ; 328 were sent to the hospital for treatment ; 3,815 treatments were given on the estate, and milk was prescribed 236 times."

Throughout Sumatra there are now 35 Central hospitals. Each institution comprises the hospital proper, a laboratory, and a



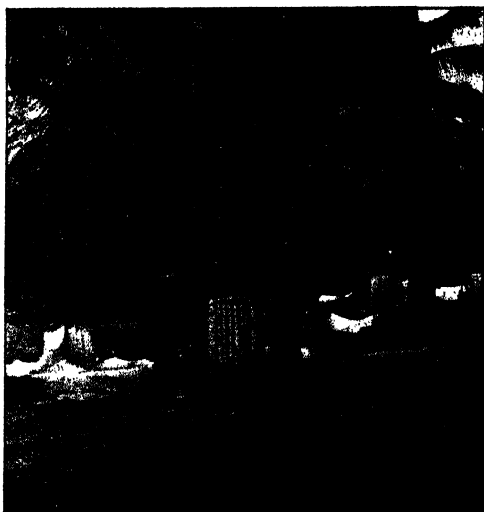


Fig. 4.—View of latrines consisting of small wooden houses with galvanized iron roofs over pits 1 ft. broad by 3 ft. long by 3 ft. deep. Though the pits had wooden covers, and the faeces were covered daily with hot ashes from the incinerator and disinfected with izal, each pit being burned out and closed after five days' use, large numbers of flies were found to breed out. Oil-tins, kept well cleaned and with 1 $\frac{1}{2}$  inch of dilute izal at the bottom, were therefore substituted for the pit latrines with good results.

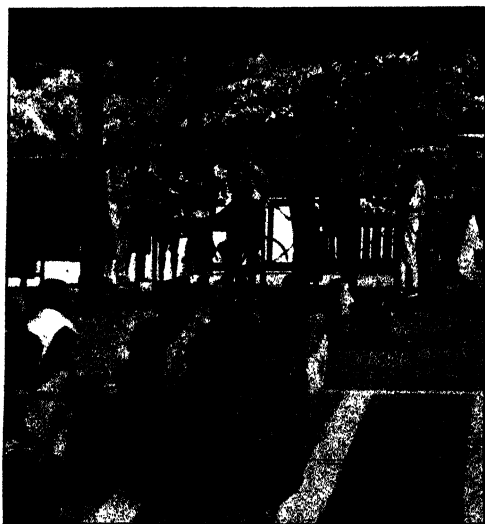


Fig. 5.—Taking blood smears, haemoglobin examination, and hookworm treatment at the six-monthly routine inspection.

[Figures 1 to 5 are reproduced by permission from the *Transactions of the Fifth Biennial Congress of the Far Eastern Association of Tropical Medicine*.]

statistical bureau. "The native staff [of one of these hospitals] includes five clerks, three laboratory assistants, two pharmacy assistants, one head dresser, two other dressers and six ward attendants. There is also the kitchen personnel and a laundryman. Two of the first-class dressers take turns as night attendants. At the present time we have only 1 per cent. of sickness, including leg wounds, venereal diseases, anaemias, etc.; the number of severely sick people is very small and one man can easily care for them. He is at the same time able to administer prescribed injections."

Maternity wards are provided and are gradually becoming very popular. The difficulty of transporting the patients to hospital is overcome partly by motor ambulances and partly by narrow gauge railways which exist throughout the estates. This gets over one of the great difficulties of this treatment, namely, that of sending the really sick person from the lines to the central hospital. Every manager's estate is linked up by telephone, which greatly facilitates the work of collecting the sick. Patients near the hospital are brought in on stretchers.

The hospital is well designed and equipped; water is laid on; latrines making use of izar are in use. First aid centres are provided on each estate.

The writer goes on to give some interesting details concerning the various diseases. Malaria is not common and hookworm is practically eradicated, great care being taken with all new arrivals.

SPENCE (B. H. H.). **The Wadi Halfa Quarantine.**—*Jl. Roy. Army Med. Corps.* 1924. Nov. Vol. 43. No. 5. pp. 321-340. With 11 figs. [2 refs.]

For the purpose of irrigation works between the Blue and White Niles it became necessary to introduce yearly 15,000 labourers from Egypt, a country where typhus and relapsing fever, other general infections and parasitic worm diseases, such as ascariasis, ankylostomiasis and schistosomiasis, are found; the last two infestations are already prevalent in the A.E. Sudan. The necessary measures were carried out at Wadi Halfa, and this interesting and instructive paper gives the details, which should be consulted by all who have a similar problem to solve, for the arrangements were ingenious as well as effective. It must suffice to print the conclusions:—

"(1). The Government of the Anglo-Egyptian Sudan, faced with the necessity of importing 15,000 labourers from Southern Egypt in the winter of 1920-21, decided to have them all inspected, loused, vaccinated and examined and treated for parasitic worm infestation, with a view both to improving their value as labourers, and to protecting the country against the introduction of bacterial, protozoal, and metazoal diseases.

"(2). The existing quarantine at Wadi Halfa was adapted for the ends in view.

"(3). With a staff consisting of one medical officer, one laboratory assistant, and thirty locally enlisted Berberines, the labourers were inspected, loused, vaccinated, and examined and treated for parasitic worm infestation at the rate of 250 a day.

"(4). 100 per cent. of 14,077 labourers from Southern Egypt were found to be lousy. All men had their heads cropped and their bodies shaved. No cases of louse-borne disease occurred amongst these men

throughout the season, whereas 2,000 Yemenis admitted at Port Sudan without proper precautions suffered severely from an outbreak of relapsing fever.

"(5). Five per cent. of 14,077 picked labourers from Southern Egypt were found to be anaemic. 0.5 per cent. were so anaemic that it was considered advisable to send them back to Egypt. In the absence of parasitic worm infestation, heavy infestation with lice was the only obvious cause of anaemia in certain cases.

"(6). Forty per cent. of 14,077 picked labourers from Southern Egypt were found to harbour from one to four kinds of parasitic worms, twenty per cent. having ankylostomiasis. Four grammes of thymol appeared to be more efficacious than three cubic centimetres of chenopodium oil in the treatment of parasitic worm infestations amongst Egyptians. In no case were more than 200 ankylostomes

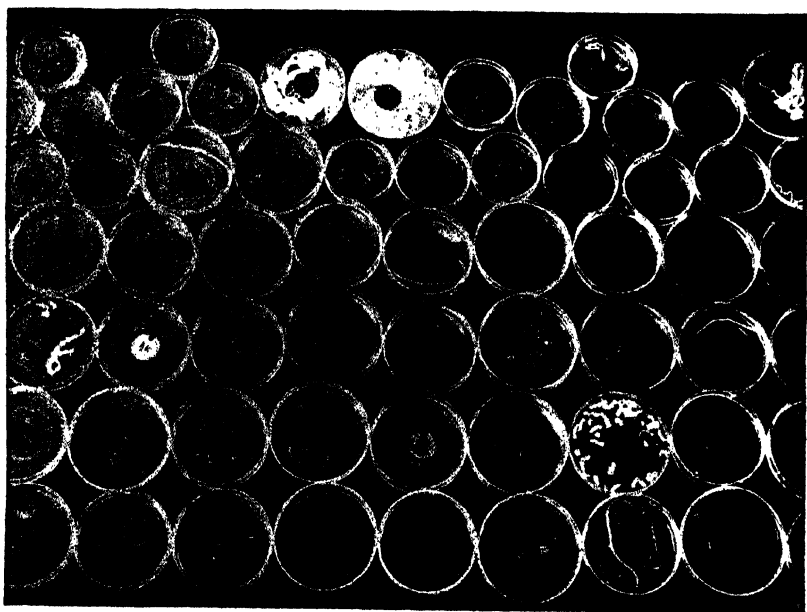


Fig. 6.—Part of a collection of worms from 150 men.

recovered from a man, a result in keeping with the general appearance of the infested men. Many thousands of male and female ankylostomes were examined. All proved to be *Ankylostoma duodenale*.

"(7). 18.5 per cent. of 14,077 picked labourers from Southern Egypt were found to be suffering from urinary schistosomiasis. 0.7 per cent. had to be sent back to Egypt on account of the severity of their disease. Twenty per cent. of these labourers suffered from nervous retention of urine when called upon to micturate during medical inspection. These men were catheterized, and in 3,000 so dealt with only one stricture was encountered.

"(8). The Government of the Anglo-Egyptian Sudan, convinced of the value of the results achieved in the first year, spent £7,000 on the

erection of permanent buildings, which were completed in 1921 and have proved extremely useful ever since."

The illustrations show the results of treatment for ankylostomiasis; the men were treated with thymol and chenopodium oil, and were purged with magnesium sulphate.

"As they emerged from the lousing building, between 11.30 a.m. and 1 p.m., they received a second purge similar to the first, and



Fig. 7.—The day's haul sorted out.

[Figures 6 and 7 are reproduced by permission from the *Journal of the Royal Army Medical Corps.*]

were then shut up till 6 p.m. in a compound specially set aside for the collection and examination of faeces.

"In a room in this compound shelves were put up for the accommodation of 250 enamelled iron basins, 10 inches in diameter, with tin lids, and numbered from 1 to 250. The places for the basins

were also numbered, and in each basin was placed a metal disc bearing the corresponding number. It will be recollected that the men themselves were marked [with Ag No<sub>3</sub> 10%] with indelible numbers. When a man desired to defaecate he entered the room and exhibited the number on his forearm to the attendant, who gave him the basin bearing his duplicate number. He defaecated into this, urinating into a separate receptacle, and then returned the basin to the attendant, who replaced it on the shelf till it was required again. In this manner all faeces passed by the men were collected between 6 a.m. and 6 p.m. on the day of treatment.

"Next morning two locally-trained laboratory attendants sifted each collection of faeces and recovered the worms for subsequent counting and classification. A basin containing faeces and identity disc was inverted over a fine wire sieve containing fifty meshes to the linear inch. A gentle stream from the tap was allowed to play on the sieve till all the soluble and finely divided material had been washed through. The sieve was then inverted over a black papier mâché tray into which the identity disc fell, followed by the worms, aided by a gentle stream from the tap. The worms, rendered visible by the black background, were easily picked up with a toothpick and placed in a Petri dish containing normal salt solution, to which the identity disc was also transferred." (Figs. 6 and 7.)

GUNASEKARA (S. T.). **Public Health in Ceylon.**—*Jl. Ceylon Branch of the Brit. Med. Assoc.* 1924. Sept. Vol. 21. No. 2. pp. 64-71. [4 refs.]

Sanitation in Ceylon is "administered" (if the term here have any real significance) at present in Colombo, Galle and Kandy by the Municipalities; in the town of Nuwara Eliya by the Board of Improvement; and in rural parts by Local Boards of Health, District Sanitary Boards, and Village Committees—but in some rural parts apparently not at all. Presumably the four large towns named have a sanitary policy; but the various local boards and committees have not, and are awakened to a sense of their responsibility only by a serious outbreak of infectious disease or by a vigorous Chairman.

The Government appears to have been not quite satisfied with this state of affairs. In 1912 the inevitable Advisory Committee was appointed to consider the institution of a properly equipped Public Health Department, having statutory powers; and in 1914 a Sanitary Branch of the Civil Medical Department was duly constituted, the efficacy of which may be estimated by a description given of it five years afterwards as a body whose officers "have no status under any law, no representation on any Board dealing with sanitary matters, and no means of securing that their advice in important matters is followed." In 1923, however, the M.O.H. of the Central Province was appointed *ex officio* member of the various Local Boards and of the single Urban District Council of that province, and one M.O.H. of the Western Province received a similar but less extensive honour; and more recently the Assistant Sanitary Commissioner of the Island has been appointed a member of the Local Board of a district having the suggestive name Moratuwa.

The author does not tell us anything of the composition of the local boards that have been thus reinforced; but as he states candidly of Ceylon that "there is very little public spirit in regard to sanitary

matters and no 'sanitary conscience' at all among the people," and that among the lower classes "the ignorance of sanitation is appalling," one is justified—on the principle that the standards of a people are embodied and reflected in its indigenous local rulers—in doubting whether the Local Boards and Village Committees of Ceylon are capable of much discrimination, or of any constructive attainment, in matters of Public Health.

The author seems to be very sensible of the significance of the deficiencies to which he has attracted attention, and he concludes with some reasonable recommendations for their rectification.\*

**I. W. D. M. Some Experiments for the Solution of the Rural Health Problem of India.**—*Indian Med. Gaz.* 1924. Dec. Vol. 59. No. 12. pp. 619–621.

The author tells us, what everyone knows only too well, that rural sanitation in India has been perfunctory. Recently sporadic attempts at improvement have occurred, at any rate, in the United Provinces, in Bihar and Orissa, and in Bengal. In Bihar the Gaya District has lately been divided into 44 sanitary circles, each having an area of about 100 miles and a central dispensary with a small staff under a doctor who receives Rs. 100 per month. The doctor not only inspects water supplies, corrects nuisances, and instructs the people in the laws of health, but also treats the sick and officially reports epidemics. A doctor like Chaucer's parish priest, "benigne, and wonder diligent," might do the job. The scheme has been going since June, 1923, and already 270,000 patients have been treated (10,000 in their own homes), 982 villages cleaned by the sanitary coolies, 12,389 wells cleansed, and many leaflets distributed and lectures and lantern shows conducted. In Bengal a "Central Co-operative Anti-malaria Society" has been formed with the object of creating local centres of public health activity throughout the village-communities of Bengal. Thirty-three centres are now in existence. The author says little of what they are doing, more than giving somewhat dubious antimony injections to kala azar patients; and little of their financial basis, beyond that they have been backed by philanthropists and helped by two government-grants of Rs.10,000 each.

All this accomplishment does not amount to much, after all. But, as the author says, with a detached candour permissible only in a philosopher, sanitary reform must proceed with circumspection, lest the increasing multitudes too soon saved by the sanitarians from destruction by disease perish of hunger. The author faces this paradox with a surer faith in the entirely orderly progress of humanity and the steady invincibility of human foresight than the reviewer, at the present moment, can share with him.\*

**MASSEY (Arthur). Travel and the Spread of Disease.**—*Public Health.* 1924. Dec. Vol. 38. No. 3. pp. 84–88.

This author's speculations, proceeding from a historical retrospect—albeit a sketchy one—are not to be lightly regarded. However they may have originated and spread in time and circumstance, it is common knowledge that some frightful diseases, such as plague and syphilis, have been diffused all over the world by increasing and extending

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\* Summarized by Lt.-Col. A. ALCOCK.

facilities of intercourse. The author makes this a text for an admonitory discourse on the menace of air-travel when long-distance voyages and the carriage of cargo by air become things of every day. Such speed of transport would make ordinary quarantine worthless, since (even if it were not entirely evaded) an imported infection might be in an unsuspected stage of incubation; infected vermin (rats) would speed with surer maleficence; and refuse and excreta from air-ships would not always fall harmless into the open seas. As a presage, the author reminds us of the lady, who, conveniently evading all formalities of quarantine, re-introduced rabies into this country by aeroplane. He thinks that a new medical service may be required for the air-ports of the future, and that its duties will include, *inter alia*, medical inspection of all passengers, fumigation of aircraft, and attention to the arrangements for disposal of the excreta of the voyage. [As a pregnant illustration of his argument the author might have instanced tularaemia—that most flagrantly infectious disease of recent discovery.]\*

HOME (W. E.). **Diseases of Merchant Seamen.**—*Jl. Roy. San. Inst.*, 1924. Nov. Vol. 45. No. 6. pp. 265–270. [1 ref.]

Here is some deservedly trenchant criticism of the Board of Trade Return of Casualties and Deaths in the Merchant Service. Its classification is antiquated, its price is exorbitant, and although the deaths are classified according to nationality (British, Lascar, Foreign), the necessary data for calculating death-rates are not supplied. The author has taken the trouble to get these data for himself for 1921, and has now calculated the death-rates according to nationality (as above specified) and compared them with corresponding death-rates in the Navy and the Air Force for that year. In this comparison the death-rates for the Merchant Service are excessive in respect of typhoid fever, malaria, and drink, and very high (nearly as high as the Navy) for pneumonia. As regards the components of the Merchant Service, Lascars have a mortality from pneumonia five times, from tuberculosis  $4\frac{1}{2}$  times, and from "all diseases"  $2\frac{1}{2}$  times as high as British seamen.

The author appeals to the Sanitary Institute to make petition for the seamen's health to be under the care of the Ministry of Health, and in other ways he speaks up sensibly and forcibly for poor Jack.\*

i. DINGUIZLI. **Les sources de propagation des maladies contagieuses chez les musulmans de l'Afrique du Nord.**—*Bull. Acad. Méd.* 1924. Oct. 28. Year 88. 3rd Ser. Vol. 92. No. 35. pp. 1049–1053.

ii. ——. **Améliorations hygiéniques à introduire dans les lieux de réunion en commun des musulmans de l'Afrique du Nord. Utilité de créer en Tunisie une police sanitaire spéciale pour les indigènes musulmans.**—*Ibid.* Nov. 4. No. 36. pp. 1086–1092.

i. This is a racy paper, with some eloquent brief descriptions of the baths, barbers' establishments, cafés, etc., where the natives of North Africa congregate and spread their infections. In the baths, which are numerous and where a lot of people have to use the same water and perhaps the same towels, the author has often seen syphilitics

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\* Summarized by Lt.-Col. A. ALCOCK.

and sufferers from tuberculosis with open sores bathing among their brethren. In the equally numerous barbers' shops, where a variety of minor surgery and dentistry still dignifies the barber's profession, the cleansing of the various instruments in common use is not thought of, and the author has no doubt of their being foci for the spread of syphilis and tubercle. In the cafés the cups are very dubious, and even more so the tobacco-pipes for common use. Perhaps worse than all these are the *zaouias*, which appear to be a sort of common pot-house by day and a free lodging-house by night. The author gives a very unflattering description of the personal appearance and sanitary state of their unceasing streams of frequenters. Finally he speaks of the itinerant sellers of pastry-stuff, with their wares freely exposed to dust and flies, as a perpetual source of the bowel-complaints that "decimate the little Arab children."

ii. The author, who here professes his faith as a Mussulman and must therefore be presumed to speak with some knowledge of what his compatriots will put up with, and with some appreciation of their tastes, here proposes methods of ameliorating the insanitary disorder and confusion described in the foregoing paper. He advocates the enlisting of a native sanitary police of some sort to exercise a strict and scrupulous, but genial, supervision over baths, barbers' establishments, cafés, and *zaouias*. The present baths should be suppressed altogether, and baths capable of being cleansed, and adequately provided with sanitary annexes, substituted. The tribe of Lazarus should be driven from the *zaouias*, which should be kept closed at night; and if necessary night caravanserais could be established without the city, where the indigent unclean hordes could be disinfected. The range and nature of the duties of sanitary surveillance of baths, barbers, and cafés are described in great detail. The author believes devoutly in elementary education in personal hygiene; not only would he employ popular placards, tracts, and mass meetings in the vicinity of the mosques for educational purposes, but he would also invoke the aid of the Muses, audibly rendered through the gramophone, in all places of popular resort, so that the populace might continually hear of the blessings of a sanitary life and at last come to believe in them. He gives some samples of his own spirited Tyrtæan compositions for that instrument, some of a declamatory kind against flies and other infective vermin, promiscuous expectoration, dirty cups, and foul linen; others of a hortatory kind inculcating disinfection of implements in common use and avoidance of intercourse with obviously infectious persons.\*

GORDON (Jehoasch). **Ueber den jetzigen Stand der Epidemiologie und Bekämpfung der Infektionskrankheiten in Palästina.** [Infectious Diseases in Palestine, their Epidemiology and Preventive Measures.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1924. Sept. Vol. 28. No. 9. pp. 387-397. With 1 chart in text.

An account of the incidence of disease in Palestine in 1922 and of some of the preventive measures carried on by the sanitary service established under the British administration. The overpowering disease in Palestine is malaria, which, however, seems to be decreasing with the steady progress of preventive operations. Statistics are given of the mosquito breeding-haunts dealt with in towns and

\* Summarized by Lt.-Col. A. Alcock.



villages, the consumption of petroleum, and the issue of quinine. About 30,000 blood examinations were made in the laboratories. A good deal of information is given under the heading of Entomology, but nothing more than is to be found in BUXTON's report (this *Bulletin*, Vol. 21, p. 432). Another ever-present trouble is trachoma; though not so bad in the north, in the district of Nablus 61 per cent. of the inhabitants and in southern Palestine as many as 97 per cent. are said to be infected. Plague appeared in Jaffa in July and lasted into November; there were 63 cases and 19 deaths; 2,346 rats (grey and black) were killed and 42 found infected: *X. cheopis* was the flea. The number of persons who received antirabic treatment was 555, and 8 deaths were recorded; carbolized vaccine was used; 2,166 sick or suspicious animals were destroyed. A sudden outbreak of smallpox (37 cases, 6 deaths) occurred at Hebron in Jan.-Feb. Measles (117 cases) existed in the districts of Gaza and Ramallah, mostly in Nov.-Dec. Of scarlet fever 83 cases (no deaths) were recorded; of diphtheria 83 cases (8 per cent. fatal); of whooping-cough 193 cases (6.7 per cent. fatal); of mumps 175 cases (56 in March); of cerebrospinal meningitis 23 cases (19 deaths); of typhoid fever 208 cases (32 deaths); and of paratyphoid 63 cases (5 deaths); of relapsing fever 25 cases (no death); of bacillary dysentery 129 cases (31 Shiga and 24 Flexner Y in the stools examined). In 220 cases of amoebic dysentery amoebae or cysts were found. Typhus fever occurred sporadically all over the country throughout the year. The number of lepers in the country is given as 120; 10 new cases were diagnosed during the year. Cutaneous leishmaniasis is common. Of bilharziasis 19 cases were treated with antimony tartrate. The helminth parasites detected in the laboratory were *Trichocephalus* 288 cases, *Ascaris lumbricoides* 185, *Taenia saginata* 23, *Hymenolepis nana* 17, *Ancylostoma duodenale* 5.

A P.S. contains the following addenda:—Plague 6 cases, smallpox 1, typhoid fever 19, relapsing fever 2, cerebrospinal meningitis 3.\*

GARCIA (O.), VAZQUEZ-COLET (A.), & LACY (G. R.). **Bacteriological Examination of Stools of Food Handlers in Manila.**—*Philippine Jl. Sci.* 1924. June. Vol. 24. No. 6. pp. 735-741. [1 ref.]

The authors describe an investigation into the number of food handlers who may be carriers of enteric or cholera. The conclusions are given below:—

"Schule reports that in the area served by the German laboratory at Trier it was possible to determine the source of 67 per cent. of the infections occurring in that area during 1918. Sixty per cent. of the infections were due to contact with other cases, 5 per cent. to contact with carriers, and 1 per cent. each to infected milk and water."

\* \* \* \* \*

"... it will be seen that the total number [in Manila] of those classed as food handlers, contacts, and healthy persons is 4,525, and that all of them were negative for typhoid, paratyphoid, dysentery, cholera, and non-agglutinating vibrio. Only a small portion of the 1,017 patients and convalescents were clinically positive for typhoid or dysentery, and from these typhoid bacillus was isolated nineteen times,

\* Summarized by Lt.-Col. A. ALCOCK.

paratyphoid A bacillus once, and dysentery (Shiga and Flexner) twenty-two times."

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"Combining the results of the two groups [only one of which is included above] we have a total of 6,143 examinations of stools from apparently healthy people with only two positive for typhoid bacilli. Using the same technic for the examination of stools from patients, we obtained a reasonable number of cultures positive for typhoid and dysentery."

HUTCHINSON (F. H. G.). **Rapport sur le lazaret de Camaran.**—*Bull. Office Internat. d' Hyg. Publique*. 1924. Apr. Vol. 16. No. 4. pp. 429-445. With 2 plans. [1 ref.]

Col. Hutchinson, the Public Health Commissioner with the Government of India, visited the Island of Kamaran, which is used as a quarantine station for pilgrims to Mecca and Medina. He describes the arrangements there, which he considers to be now satisfactory in the main (whatever they were a few years ago). There are two separate camps, one for ships free from disease and another for ships that have had cases of cholera, smallpox, etc., on the voyage to the Red Sea. These camps are entirely distinct, and each is provided with a satisfactory disinfecting station. The pilgrims on arrival have facilities for bathing, their clothes being sterilized in a steam sterilizer, and proceed on their journey within about 24 hours, provided the ship is not an infected one and unless the number of pilgrims is very great.

In the infected boats greater precautions are taken. As pointed out by the author, if the pilgrims were vaccinated for smallpox before they start this disease should be non-existent; and if they were inoculated with a mixed cholera vaccine little or no cholera should be found amongst them. Measures taken before embarkation are therefore much more important than those taken at Kamaran.

BARNES (M. E.). **Public Health Developments in Siam.**—Reprinted from *The Nation's Health*. 1923. Oct. Vol. 5. No. 10. 5 pp. With 5 figs. [2 refs.]

The writer gives a popular account of health administration and progress in Siam. We have already dealt with this subject under the head of the annual report. The following short extracts give an idea of the arrangements and improvements that are of recent date.

"(1) Central administration. Under this head is included Government Medical Depot and the administrative control of importation and distribution of all habit-forming drugs.

"(2) Health administration. This includes infant welfare work and direct and co-operative health educational work with the Health Section of the Siamese Red Cross Society.

"(3) Control of epidemic diseases.

"(4) Public Health Inspection. This includes public health laboratory service.

"(5) Inspection of medical services, including care of the insane.

...

"The health work of the City of Bangkok is conducted under a separate budget through the office of a medical officer of health. The programme of the office includes (1) hospital administration, (2)

laboratory service, (3) maritime quarantine for the port of Bangkok, (4) infectious disease control, (5) sanitary inspection, (6) provision of public abattoirs, (7) medical service for the Bangkok prisons."

PALESTINE. **Proceedings of the Tenth Meeting of the Antimalarial Advisory Commission, 20th November, 1924.** [HERON (G. W.), Director of Health, President.] [MS. received from the Colonial Office.]

This report reflects great activity. One of its most interesting items is the survey of the Huleh Marshes, an area of about 175 kilometres surrounding and including the "Waters of Merom"—a very fertile tract circumscribed by hills and therefore abounding in springs and very malarious, every one of the Palestine species of *Anopheles* having been discovered breeding there. The survey is the prelude to a scheme for reclamation of this waterlogged area for cultivation. Some interesting statistics are given of the results of recent drainage and reclamation in the neighbourhood of Beisan: in 1922, before the institution of antimalaria measures, fifty per cent. of the patients attending the Government dispensary at Beisan were malaria cases, and the spleen-rate in schools was 50, but in 1924 the percentage of malaria cases had fallen to 12 and the spleen-rate to 25. Another item of interest is the account of the measures followed for the protection from malaria of the labour force of 450 men employed on drainage and irrigation in the Kibbarah Concession area. Hours of employment were fixed from 7 a.m. to 4 p.m., when mosquitoes, usually, are not active; for the mid-day recess special shelters were provided, to obviate resort to the suspicious shade of trees; gamete-carriers were detected and either treated or removed; quinine was given in daily alternating doses of 10 gr. and 5 gr. The prophylactic virtue of this quinine was not, however, demonstrated; all men equally received it, but while the fever incidence among the men who lived near the swamp was from 6 to 12 per cent. according to race, that of the men who lived in a neighbouring town was 1.5 to 2 per cent. An instructive lesson is afforded by the account of the annual Nebi Rubin festival held in the neighbourhood of a swamp at a time of year (August and September) when malaria most prevails. Last year it was attended by 70,000 people from towns in the vicinity. Many of the visitors ultimately developed malaria. Among the visitors was the mayor of Ramleh and his retinue of 42 persons; all but the mayor contracted malaria. Nevertheless a preliminary survey of the swamp and wadi has been made and the District Governor has taken up the matter.

In his general review the President of the Commission states that "Palestine has been satisfactorily free from any serious outbreaks of malaria during the last six months," and that the incidence of malaria in towns has been "almost negligible."\*

WATSON (Malcolm). **Observations on Malaria Control, with Special Reference to the Assam Tea Gardens, and some Remarks on Mian Mir, Lahore Cantonment.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1924. Oct. 23. Vol. 18. No. 4. pp. 147–153. With 15 figs.

The author begins with an instructive reminder of his experience in the coast hills of Malaya, where ravines freed from a shade-haunting

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\* Summarized by Lt.-Col. A. ALCOCK.

malaria-transmitting mosquito (*Anopheles umbrosus*) by clearing away jungle, were discovered to be merely prepared for the invasion of another transmitter (*A. maculatus*) that prefers open country. The trouble was rectified by subsoil drainage (and oiling) of the breeding places of the latter species.

Then he describes Upper Assam, the rich alluvial "valley-way" (as some physiographers call it) of the Brahmaputra. This valley-plain, once covered with jungle, is now under rice-cultivation. The local species of *Anopheles* are *A. fuliginosus*, *minimus*, *sinensis*, *maculatus*, *gigas*, *rossi* var. *indefinitus*, and *barbistrotris*, of which *minimus* and *maculatus* are the dangerous ones. The estates most afflicted by malaria were among the best managed in Assam, no pains being spared to ensure the health of their coolies. In various places where *A. maculatus* and *minimus* were abundant the spleen-rate among children (altogether 9,146 were examined) was 69 per cent. "Cattle, which were in great abundance, seemed to give the coolies little protection," although *A. fuliginosus* was found far more abundantly in cow-sheds than in houses in Jan.-Feb.

"The physical features associated with malaria were: (1) River-valleys, whether large or small, but not when as large as the Brahmaputra at Dibrugarh. (2) Swamps and *bhils* in dead river-beds or in the flood-plains of living rivers. (3) Natural hollows or water channels, which may be dry in the dry season. (4) Narrow rice-fields under certain conditions, especially in land above the 400 ft. level. (5) Wet waste land, *kurkani* land, and some thatch land.

"The physical features not associated with malaria were: (1) Broad, flat rice-fields. (2) Old broad, dead river-channels, dry in the dry season. (3) Dry thatch land, if not *kurkani*. (4) Bamboo clumps. (5) Some brickfields."

As it would have been too destructive and expensive to any individual estate to remove the cooly-lines to a central spot (and to abolish all the *Anopheles* breeding-places within half-a-mile radius of it), the plan of malaria-prevention recommended by the author was, drainage of breeding-places (aimed particularly at *A. maculatus* and *A. minimus*), the use of oil where necessary, and administration of cinchona to children and fever cases.

As regards Mian Mir, which he visited after leaving Assam, the author considers that it is not and never has been properly drained. It has been assumed that no outlet for drainage exists, but the question of pumping does not seem to have been considered.\*

LEPRINCE (J. A.). **What the Engineer can and should do toward Prevention of Malaria and Mosquito Nuisances.**—*Amer. Jl. Public Health*. 1924. Dec. Vol. 14. No. 12. pp. 1035-1037.

Few will dissent from the opinions here expressed that in anti-malaria operations [it may be presumed that the author refers to operations on an extensive scale] there is a very considerable technical element that lies exclusively within the province of the engineer. It is true that the engineer, concerned only with certain of his own particular professional pursuits, may unconsciously have been—or still be—responsible for the creation of breeding-places for mosquitoes, and even that some of the engineers at Panama were inclined to be facetious over the anti-mosquito measures that ultimately ensured the

\* Summarized by Lt.-Col. A. ALCOCK.

construction of the Canal. But, in the fullness of our present knowledge of malaria causation, this should teach us, not to despise the co-operation of the well-informed engineer in devising definite anti-mosquito plans, but rather to co-operate so closely with the engineering profession that all its members become sufficiently instructed to eschew "engineer-made *Anopheles* production" and "building malaria in" as deadly professional sins even in enterprises not directly connected with sanitary engineering. The author gives here a programme of what the engineer can do in this matter; but as it is devised to instruct and influence his own, rather than the medical profession, the plea of *ne sutor supra crepidam* may justify this brief acknowledgment of its educational purpose.\*

UNITED STATES. **Treasury Department. Annual Report of the Surgeon General of the Public Health Service of the United States for the Fiscal Year 1923.** [CUMMING (H. S.) Surgeon General.]—pp. vi + 316. With 10 figs. 1923. Washington: Govt. Printing.

"*Studies of highways in relation to malaria.*—'Man-made malaria'—that is, malaria caused by man's interference with natural drainage—has frequently followed highway construction in many parts of the United States. Because of the recent impetus given to the building of good roads, this subject has been considered of sufficient importance to warrant special study at this time. The matter was taken up with the Chief of the Bureau of Public Roads, with the district engineers of this bureau located in the South, and with the various State health officers and State highway engineers concerned. The importance of placing culverts low enough so that they will drain all possible mosquito-producing areas near by and the abolition of all roadside borrow pits was pointed out to those in charge of highway construction. It has been found that these details, so important from a health standpoint, are much better taken care of on those highways constructed under the Federal highways act than is the case with the roads which are being built by county road commissioners. Effort is being made to impress county commissioners and road supervisors with the importance of roadside drainage."

WORLD'S HEALTH. 1924. Feb. Vol. 5. No. 2. pp. 45-47.—**Fighting Malaria. III.—In Greece.**

This article gives a popular account of anti-malarial measures in Greece, viz.: anti-larval measures, popularization of quinine, and propaganda. Throwing common chalk in a fine powder on the surface of stagnant water about once a week is used as a means of making puddles unattractive to mosquitoes. Whether this has any real effect or not the writer does not say.

BARBER (M. A.) & KOMP (W. H. W.). [The Hydrogen Ion Concentration of Waters in Relation to Anopheline Production.]—*Trans. Fourth Conference Malaria Field Workers Chattanooga, Tenn. November 14-16, 1922. Public Health Bulletin. No. 137. pp. 11-12.* [Summarized in *Public Health Engineering Abstracts* 1924. May 24. J.—712.]

"Several hundred determinations of the hydrogen-ion concentration were made by the colorimetric method in some 50 different ponds, pools,

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\* Summarized by Lt.-Col. A. ALCOCK.

ditches, springs and other varieties of water. The work was done in Escambia County, Alabama, during the period July-November, 1922, a period showing great variations in dryness and temperature. The hydrogen-ion concentration varied from a pH of 5.0 (ditch below a certain spring) to a pH of 8.0 (overflow of artesian wells). Abundant Anopheline production was found in both of these extremes and in waters of nearly every intermediate grade of pH between them. Many larvae were bred out for identification, and all three species of anopheles common in that region, *Anopheles punctipennis*, *A. quadrimaculatus* and *A. crucians*, were found in waters of greatly varying pH.

"Field observations on the growth-rate of larvae indicated that there was no measurable difference in the growth-rate of anopheline larvae in water of a pH of 6.0 and one of 7.5. The general conclusion was that over the pH range tested no measurable correlation appeared between hydrogen-ion concentration of waters and intensity of anopheles production in the case of any of the three species of anopheles common in the southern United States.

"During 1923 and 1924 anopheles breeding has been observed in southern Louisiana in waters ranging from a pH of 6.0 to one of 8.0 and above. In aquaria the growth rate of anopheles larvae has been about the same in a water of 6.2 as in one of 8.0."

KENYA MEDICAL JOURNAL, 1924. Sept. Vol. 1. No. 6. pp. 159-165.—**The Economic Aspect of Plague in Kenya.**

The following short extracts are of interest.

"The cotton ginneries and stores which have been recently constructed in Kavirondo have . . . good cement concrete flooring . . . while the galvanised iron walls have a projecting ledge bolted on about two feet six inches above the ground level. . . .

"In dwelling houses and shops precautions should be taken to prevent access of rats to food. The problem is simpler than where grain stores are concerned, and merely consists in the storage of food-stuffs in rat-proof receptacles. Small collections of bagged grain should be stacked on trestles. Houses and shops should, wherever possible, be of permanent construction as already indicated. The old type of plinth, composed of stones, earth, and a thin coating of cement, on which small shops in Reserves and outlying townships were formerly erected, should disappear for ever; it is difficult to imagine a more desirable form of residence from the rat point of view than buildings of this kind. . . .

"... The only method of adequately dealing with rats, so far as close contact with man and his commodities are concerned, is to build them out of existence."

RAYNAUD (Lucien). **Note sur la peste en Algérie dans les vingt-cinq dernières années. Cas humains.—Espèces de rats et de puces de rats. Organisation de la lutte.—Bull. Acad. Méd.** 1924. Nov. 18. Year 88. 3rd ser. Vol. 92. No. 38. pp. 1188-1192. With 1 fig.

In the 25 years 1899-1924 four hundred cases of plague were reported in the various ports and inland towns of Algeria—349 bubonic, with 147 deaths; 30 pneumonic, with 28 deaths; 19 septicæmic, with 17 deaths; 2 "typhic," both fatal. In 1907 a ratticide service was established, with branches at Oran, Algiers, Bougie, Philippeville,

Bône, and La Calle, and between 1908 and 1924 near a million rats were accounted for and identified, along with their fleas. Of the rats 74 per cent. were *Mus decumanus*, 13 per cent. *M. rattus*, 4.5 per cent. *M. alexandrinus*, and 11 per cent. were merely "mice." Of the fleas *Xenopsylla cheopis* was by far the commonest; the other species were *Ceratophyllus fasciatus*, *Ctenopsylla musculi*, *Ctenocephalus "serraticeps"*, and a small percentage (0.4) of *Pulex irritans*.

The author states that plague becomes attenuated in the native rats but becomes virulent again through importation of fresh strains from abroad.\*

WU LIEN-TEH. **Plague in Wild Rodents, including the Latest Investigations into the Rôle played by the Tarabagan.**—*Far Eastern Assoc. Trop. Med. Trans. Fifth Biennial Congress Singapore, 1923.* pp. 305-340. With 5 figs. [102 refs.]

In this article, which contains much information on the subject of the title, there are two tables which may be usefully reproduced.

TABLE I.—LIST OF RODENTS KNOWN TO SUFFER FROM SPONTANEOUS PLAGUE OTHER THAN THE DOMESTIC RAT AND MOUSE.

Name.	Locality.	References.
(a) Tarabagan, <i>Arctomys bobac</i>	Transbaikalia, Mongolia, &c.	Bjeliavski & Rjeshetnikoff, "Vestnik Obshchestvennoi Guiguiny," 1895.
b) Sisel (suslik), <i>spermophilus</i>	Kirghiz Steppes	Deminski, <i>Russki Vrach</i> , 1913, No. 30, p. 1069; and Berdnikow, <i>Zentralb. f. Bakt.</i> , 1913, vol. lxix, pp. 251-259.
(c) Jerboa (family Dipodidae, species <i>Dipus</i> )	"	Berdnikow, <i>ibid.</i>
(d) Californian ground squirrel, <i>Citellus beechyi</i> , Richardson.	California ...	Wherry, <i>Journ. Infect. Dis.</i> , 1908, No. 5, pp. 485-506; and McCoy, <i>U.S. Public Health Report</i> , 1908, No. 37, pp. 1289-1923.
(e) Dusky-footed wood rat (brush rat), <i>Neotoma fuscipes</i> , Baird.	"	McCoy and Smith, <i>Journ. Infect. Dis.</i> , 1910, vol. vii, pp. 368-373.
(f) Field rat, <i>Hesperomys pulustris</i> .	New Orleans	William, <i>Amer. Journ. Public Health</i> , November, 1920, p. 13 of Reprint (1)
(g) Gerbille, <i>Tatera lobengular</i>	South Africa	Mitchell, <i>Journ. Hyg.</i> , 1922, No. 4, p. 377-382; and Haydon, <i>Lancet</i> , November 26, 1921, pp. 1103-1104 (2).
(h) Multimammate mouse, <i>Rattus coucha</i> .	"	" " "
(i) "Striped mouse," <i>Arvicanthus pumilio</i> .	"	Mitchell, <i>Journ. Roy. Army Med. Corps</i> , 1906, vol. vi, p. 130.
(j) <i>Cricetomys gambianus</i> Waterhouse.	Gold Coast ...	Graham in Simpson, Report on Plague in the Gold Coast in 1908, pp. 21-25.
(k) <i>Pelomys fallax iridescens</i> Heller.	East Africa...	Lurz, <i>Arch. f. Schiffs- und Tropenhyg.</i> , 1913, No. 17, pp. 593-599.
(l) Tree Rat, <i>Mus. (Thamnomys) aff. dolichurus</i> Smuts.	"	" " "

Summarized by Lt.-Col. A. ALCOCK.

TABLE I.—continued.

Name.	Locality.	References.
(m) Squirrel, <i>Sciurus palmarum</i>	{ India ...	Simond, <i>Annal. de l'Inst. Pasteur</i> , 1898, p. 664 (3)
	{ Ceylon ...	Colombo Report, 1922, p. 41.
(n) Bandicoot, <i>Bandicota indica</i> ( <i>Nesokia bandicota</i> )	India ...	<i>Journ. Hyg.</i> , 1907, Plague No., p. 760; and 1910, Plague No., pp. 459-460.
(o) Small bandicoot, <i>Nesokia bengalensis</i> .	„ ...	Hossack, <i>Journ. and Proc. Asiat. Soc. of Bengal</i> , New Series, vol. v (1906).
(p) <i>Bandicota malabarica</i> ...	Ceylon ...	Philip and Hirst, <i>Journ. Hyg.</i> 1915.
(q) Porcupine <i>Hydrochoerus capybara</i> .	Mysore (India)	Bruce Low, Local Government Board Report, 1898-1901, p. 317.
	{ Sydney ...	Thompson, Report of the Board of Health on a Second Outbreak of Plague at Sydney, 1902.
	{ India ...	Liston, <i>Journ. Bombay Nat. Hist. Soc.</i> , 1905, vol. xvi, p. 253; and <i>Journ Hyg.</i> , 1908, vol. vii, p. 891.
(r) Guinea-pig, <i>Cavia cobaya</i> ...	{ Manila ...	Schoebl., <i>Phil. Jour. Sci.</i> , 1913, pp. 417-421.
	{ Senegal ...	“Noc. Rep. sur le fonctionnement du Lab. de Bact. de L'A. O. F. en 1919,” Dakar, 1920.
(r1) [ <i>Cavia aperca</i> ...	Argentina ...	Uriarte & Gonzalez, <i>C.R. Soc. Biol.</i> , 1924, vol. 91., p. 1040.]
	{ India [?] ...	<i>Journ. Hyg.</i> , 1908, vol. vii, p. 891.
(s) Rabbit, <i>Lepus cuniculus</i> ...	{ England ...	Martin & Rowland, “Observations on Rat Plague in East Suffolk,” 1910.
(t) Hare, <i>Lepus timidus</i> ...	England ...	Martin & Rowland, <i>Ibid.</i> , and Bulstrode, Local Govt. Board Report, 1910-11, p. 36
(u) “Large field-rat” ...	Senegal ...	Laveau, <i>Bull. Soc. Path. Exot.</i> 1919, pp. 482-484 (4).
(v) Field-rat ...	Tunis ...	Gobert, <i>Arch. Inst. Pasteur de l'Afr. du Nord</i> , 1912, pp. 440-446 (4).
(w) Field-rat ...	Rhodesia ...	Kinghorn, 1918, quoted <i>Trop. Dis. Bull.</i> , vol. xiii, p. 324 (4)
(x) Field-rat ...	Persia ...	Grekoff, quoted by Clemov, <i>Lancet</i> , 1913, June 14, p. 1697 (4).
(y) “Wild mouse” ...	Astrakhan ...	Zabolotny, <i>Arch. f. Schiffs- und Tropenhyg.</i> , vol. xxvi, 1922, p. 382.
(z) “Black marmot”...	Semiretchinsk	Russian Public Health Report, 1907, p. 162.

REMARKS.—(1) Most probably identical with the “field-rodent Louisiana,” mentioned by McCoy loc. cit., 1921.

(2) Gerbilles were found infected in Tunis as well (see Gobert, loc. cit.), *Rattus coucha* in Uganda (see Uganda Protectorate Annual Medical and Sanitary Report for 1921, pp. 96-99).

(3) One palm-rat was found infected in Senegal (see Laveau, *Bull. Soc. Path. Exot.*, 1919, pp. 291-296).

(4) The four last-named field-rats were mentioned because it could not be determined if they, i.e., the field-rat of Java, are a variety of *Mus rattus* (see Swellengrebel, *Geneesk. T. v. Ned.-Indië*, 1913, pp. 53-154) or not.

(5) The shrews (Crocidae), often called “musk-rats,” belonging to the order of Insectivora, are not included, although they are known to suffer from plague [Senegal and French Indo-China].



TABLE IX.—FLEAS OF RODENTS SUFFERING FROM NATURAL PLAGUE.

Host.	Flea.
Tarabagan ... .. ( <i>Arctomys bobac</i> )	<i>Ceratophyllus silantiewi</i> Wagner, 1898
Californian ground squirrel ... ( <i>Citellus beechyi</i> )	<i>Ceratophyllus acutus</i> Baker. <i>Hoplopsyllus anomalus</i> Baker.
Gerbille ... .. ( <i>Tatera lobengulæ</i> )	<i>Dinopsyllus lypus</i> . <i>Xenopsylla eridos</i> <i>Listropsylla stygius</i> .
Multimammate mouse ... ( <i>Rattus coucha</i> )	<i>Dinopsyllus lypus</i> . <i>Echidnophaga larina</i> .
Striped mouse ... .. ( <i>Arvicanthus pumilio</i> )	<i>Dinopsyllus lypus</i> . <i>Xenopsylla eridos</i> . <i>Chiastopsylla octavii</i> . <i>Listropsylla stygius</i> .
<i>Cricetomys gambianus</i> ...	<i>Pulex cheopis</i> (R.). <i>Ctenophalus serraticeps</i> .
Indian squirrel ... .. ( <i>Sciurus palmarum</i> )	Fleas similar to <i>Ceratophyllus fasciatus</i> . <i>Loemopsylla cheopis</i> .
Small bandicoot ... .. ( <i>Nesokia bengalensis</i> )	<i>Pulex cheopis</i> .
Rabbit ... .. ( <i>Lepus cuniculus</i> )	<i>Spilopsyllus cuniculi</i> . <i>Ceratophyllus fasciatus</i> .
Hare ... .. ( <i>Lepus timidus</i> )	<i>Spilopsyllus cuniculi</i> .
Kilimandsharo rats ... .. ( <i>Pelomys fallax iridescens</i> , <i>Mus</i> ( <i>Thamnomys</i> ), aff. <i>dolichurus</i> ).	<i>Loemopsylla cheopis</i> , rarely. <i>Ctenopsylla musculi</i> , very rarely. <i>Ceratophyllus fasciatus</i> .

Table 9 may be compared with the similar table of BACOT (1919) (see this *Bulletin*, Vol. 16, p. 45).

BLACKLOCK (D. B.) & PEACOCK (W. H.). **Note on the Destruction of Rats by Exhaust Gas.**—*Lancet*. 1924. Sept 13. pp. 568-570. [1 ref.]

We have already had several articles on this subject. The writers quote a large number of experiments carried out in boxes in the holds of lighters with both grey and black rats. In every case five minutes' exposure in a confined space into which the exhaust gas of a petrol motor was discharged killed the rats. In a ship's lighter of over 2,000 c. ft. capacity 35 minutes was usually necessary. The gas has no effect whatever on such articles as lard, butter, sugar, bacon, etc. It possesses great penetrating powers and on opening up the holds very readily diffuses.

DUJARDIN-BEAUMETZ. **La dératisation, rapport sur la dératisation au nom de la Commission spéciale.**—*Ann. d'Hyg. Publique, Indust. et Sociale*. 1923. Mar. New Ser. pp. 124-144.

This paper gives an interesting description of the black and grey rat, its habits, and the best method of getting rid of it with poisons, traps, asphyxiating gas, etc. There is practically nothing in the paper which has not been described in much greater detail in other articles in these Supplements. The writer suggests for Paris that it is very necessary to have an evening service of collection of household rubbish, and not to allow it to remain all night as a source of food for the rats.

GELONESI (G.). **Derattizzazione col virus Danyasz.**—*Ann. di Med. Nav. e Colon.* 1924. Year 30. Sept.–Oct. Vol. 2. No. 3–4. pp. 153–159.

The region of Southern Somalia was over-run with rats. An American preparation, Rat-Nip, containing phosphorus, was first used with good results, but the animals soon learned to avoid it, so Danyasz virus was employed. The effects surpassed expectations. After 29 days the numbers were much diminished in one district, and a second distribution of the virus is said to have got rid of the pest altogether. In another district it was equally successful. Besides killing rats eating infected food, the virus acted indirectly by killing those feeding upon the dead rats, the bacillus, it is believed, gaining in virulence by passage through the animals. Nevertheless, total eradication by this means is said to be impossible because, apart from other considerations, the district is surrounded by extensive woods in which the rats can hide and breed in vast numbers.\*

VERVOORT (H.). **Some Remarks on Rat-Proof Roof-Building.**—*Far Eastern Assoc. Trop. Med. Trans. Fifth Biennial Congress, Singapore, 1923.* pp. 348–351. With 23 figs.

The writer deals with the subject of rendering roofs of native houses (made of palm leaves and wood or native tiles) unattractive so that they will not harbour rats.

He considers that it is possible even with atap (the leaf of the sago palm) to make a roof which is practically rat proof. They usually select the ridge for their abodes, and if this is prevented, the method of which is shown in the photographs and drawings, rats disappear; they do not live between the layers of leaves themselves.

"When covering the roof with atap, as a rule the last strip meets the opposite one at the top, in the way as given in the accompanying diagram (Fig. 8), and the whole is covered by a metal or wooden rabong

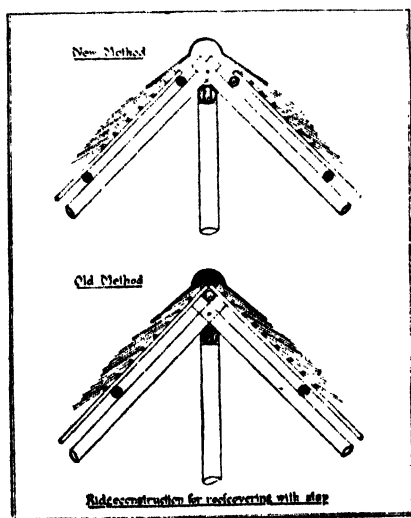


Fig. 8.—Showing proper and improper methods of ridge construction with atap.

\* Summarized by Dr. H. Harold Scott.

(cope). Instead of meeting each other at the top and at the corners, there must remain a space between the ataps of about 4 in. between both sides. For this reason the wood construction of the roof has to be changed in so far as the 'toe-toep goeloeng' has to be replaced by two strong girders (goeloeng) near the top. At the corners there has to be placed a strong 'kassau miring.'

"The figures (9, 10 and 11) will explain the construction of a model house.

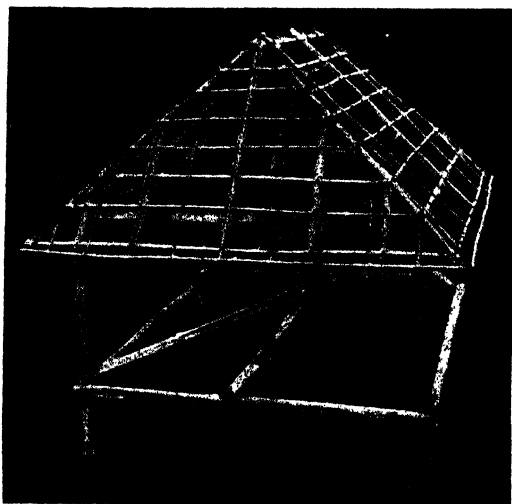


Fig. 9.—Showing wood construction of a model rat-proof atap roof.

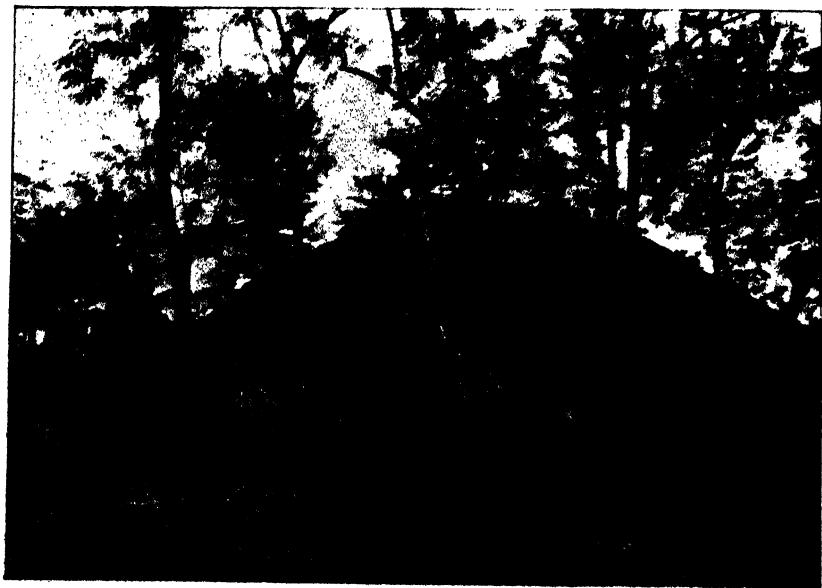


Fig. 10.—Showing open corner-ridge of a model atap roof before covering with zinc coping.



Fig. 11.—Showing finished roof of model house with zinc covering over the open corner-ridge.

“The atap is fixed no further than those parts and the corner spaces remain open, to be covered up by a zinc cope (raboeng), which can be surveyed from the inside. In 1918 I covered a show house in this way, surrounded it by a stone wall, and placed several hundreds of rats in it, but they could find no place for nesting and became a prey to their enemies.”

*Malacca Tiles.*—“Another way of roof covering, much employed by Chinese, is with Malacca or Chinese tiles. Seldom one sees these tiles on Java, but nearly everywhere on Sumatra and a part of the Outer Dominions, and specially in Malacca and the Straits. A roof

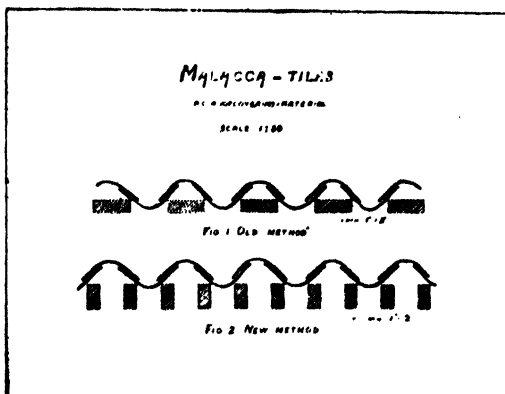


Fig. 12.—Showing improper and proper methods of constructing a tiled roof.

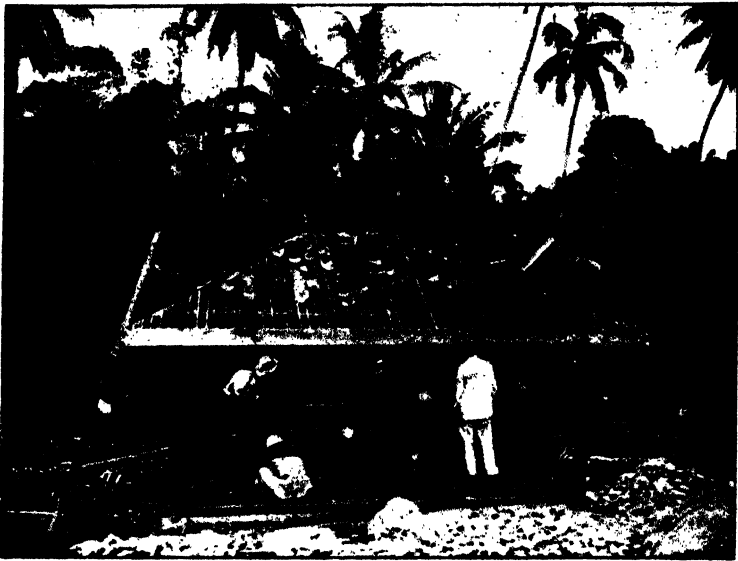


Fig. 13.—Showing wood construction for tiled roof.



Fig. 14.—Showing a completed tiled roof.

[Figures 8 to 14 are reproduced by permission from the *Transactions of the Fifth Biennial Congress of the Far Eastern Association of Tropical Medicine.*]

covered with Malacca tiles offers splendid sheltering places for rats. The construction is such that two tiles with the hollow side up are supported by a flat lath and covered by a third tile, hollow side down, which forms, with the lath, a space that may be filled up with rat-nests without it being visible. Instead of flat laths of 3 by 1 in., I proposed to use two laths of 2 by 1 in., that are placed narrow side up. A covering in this way gives no space between wood and tile, and no room for nesting, as seen in the accompanying diagram." (Figs. 12, 13 and 14.)

**FLU (P. C.). Mesures de prophylaxie anticholérique et antipesteuse aux Indes Néerlandaises.**—*Bull. Soc. Path. Exot.* 1924. Oct. 8. Vol. 17. No. 8. pp. 703-714.

The author notes that the Dutch East Indian archipelago has a coast-line as extensive as the equator and that the number of ports is as high as 275. These are divided into four classes. Those of the first class are four, Batavia, Soerabaya, Belawan and Sabang. These have a full-time port health officer and a complete sanitary organization, so that ships can be disinfected of plague or yellow fever. Of the second class there are 26 ports, and here the port health officer has other duties; they are provided with a hospital with isolation huts and steam disinfection plant, but plague-suspected ships are not admitted unless they have apparatus for clearing themselves of rats. Cholera-infected ships are admitted freely. The 55 ports of the third class have a European or native doctor, but no means of isolation or apparatus of disinfection; ships suspected of cholera are admitted. The ports of the fourth class, 190 in number, having no doctor, would be barred to ships flying the quarantine flag if the P.M.O. were not allowed to admit under certain conditions ships suspected of cholera. His is not an easy task; he has to give permission on insufficient data and risk infection of the port, or to refuse and disorganize the victualling of a large territory served by it. These ports, moreover, are used by a large number of small vessels from British territory which cannot be controlled.

The introduction of vaccination against cholera by NIJLAND completely changed the attitude towards that disease. The history of cholera at Batavia from 1909 is given. The disease was present every year, causing many deaths till 1913, when it disappeared. Every effort was made to prevent its re-importation, native passengers were carefully examined, stools of suspects were sent to the laboratory. On August 2 some cases were detected, on the 14th cholera broke out in Batavia, and in September there were 110 cases and in October 675. The examination of all stools was quite impracticable, partly owing to the numbers and partly to the fact that a single negative examination has been shown to be insufficient, and that passengers must be retained, and maintained, for further examination. In 1914, in the course of 14 days, 60 per cent. of the population of 350,000 were vaccinated against cholera. Cases began to diminish at once; in December there were 26 and in January 3. The population of Batavia is now vaccinated every 6 months, and the few cases that appear are among foreigners or natives from the interior. Before inoculation was practised the ports in regular communication with Batavia always became infected sooner or later; now every native

passenger leaving for one of these ports is inoculated, and since then they have remained free. The practice is also of great value for the pilgrims, 50,000 or 60,000 of whom leave the Dutch East Indies yearly for Mecca; since 1913 all have been vaccinated against cholera, smallpox and enteric, with the best of results. The first class ports are provided with drinking water of high quality, the best of all precautions against cholera.

The subject of the remainder of the paper is plague. It is abundantly proved that if we were able to prevent the transport of rats by ships there would be no overseas transport of plague. In practice the ordinary measures of deratization and other means, such as the prescription to ships to lie at a distance from the quay and to employ rat guards on the cables, fail, as the infection of ports in Europe has proved. Rat plague is very persistent; it is impossible to be sure that it has disappeared when it has once been present. When plague was introduced into Java in 1911, infected towns and villages were first evacuated, but the people soon rose against these measures. The houses were then severally enveloped in canvas impregnated with pitch and sulphur was ignited. The effect was to drive the rats to shelter, and the fleas often remained to start a fresh epidemic. In the fumigation of the holds of cargo-laden ships it was found that the fleas took shelter between the fibres of the rice or grain sacks as well as inside them, and were unharmed. Experimenting with small vessels the medical officers were always able to kill the rats, but fleas survived buried in the grain. With empty holds all the rats and most of the fleas can be destroyed.

Different measures are now undertaken. The medical service in the Dutch Indies has organized "deratization" of railway wagons and the lighters which convey the cargo from warehouse to ship. By fumigating the lighters every 3 months it is possible to keep down the rat population to one rat per ten lighters; at the outset the number of rats was enormous. Ships which put in 2 or 3 times a year are similarly treated. Fleas are the chief danger. Whereas the infected rat dies in a few days, the infected flea lives without food 5 to 14 days, and if it obtains blood may transmit plague 40 days after its infection. Few rats can be introduced to a ship with loads of grain, but the transport of fleas has been demonstrated at Batavia. If periodical "deratization" under the control of an international commission were to become the rule the quarantine measures could be relaxed. The ideal is rat-proof houses and warehouses, but in the Dutch East Indies this ideal will not be attained for half-a-century.

No measures are taken in the Dutch East Indies against yellow fever, for it is believed that the Americans will do all that is needful.

BRUNET (F.). **Protection sanitaire maritime contre le typhus exanthématique par les savons parasitocides servant également à l'eau douce et à l'eau de mer.**—*Arch. Méd. et Pharm. Nav.* 1924. Sept.-Oct. Vol. 114. No. 5. pp. 350-356.

The author has written several papers on this subject. His oxycyanide of mercury and petroleum soaps are made thus:—

In a capsule heated on a water-bath place 1,000 gm. of white grated Marseilles soap and mix till the consistency is that of a homogeneous fluid paste. Dissolve 20 gm. of oxycyanide of mercury in 20 gm. of distilled

water. Pour the solution into the soap paste, mix intimately and run into a mould lightly covered with white vaselin. Keep in impermeable paper.

Melt on a water-bath 650 gm. of white Marseilles soap, adding 25 cc. of water till the consistence is pasty. Liquefy at a gentle heat 100 gm. of yellow wax and add 250 gm. of petroleum. Mix the wax and petroleum solution with the melted soap so as to obtain a homogeneous mass which is run into a mould while it is still warm.

These soaps dissolve in salt water as well as in fresh and yield an abundant lather. Brought into contact with them lice die in a short time. The water should be warm and in as small quantity as possible. The oxycyanide is expensive and this soap can hardly be entrusted to ignorant persons or children; it is without smell. Petroleum is cheap enough and can be left at the disposal of anyone; it is the soap of choice for emigrants and the poor. Neither soap causes any change in substances to which it is applied; they are neither caustic nor irritant. To make sure of the destruction of nits the soap should be left in contact for about ten minutes and applied for three days in succession at least; a fine comb is used between the applications. The clothes are treated as well, and to ensure the insects being reached it may be necessary to unpick the seams. Any person on board ship can louse himself with no apparatus but a piece of soap and a little water. The soap should be kept in its impervious covering in a place that is dry and not too warm. Persons exposed to contagion should use these soaps daily.

[Reliance on such a method would be risky if the user had no great desire to rid himself of his parasites.]

GAUTHIER (Aimé). **Essais de vaccinations par la voie buccale contre la fièvre typhoïde.**—*Ann. d' Hyg. Publique, Industrielle et Sociale.* 1924. June. N.S. No. 6. pp. 347-353.

The writer gives three instances in small towns in Greece, namely, Kakossalessis, Vassilikos and Filla, where a mixed vaccine of typhoid, paratyphoid A and B and cholera was given to the population by the mouth instead of hypodermically. Epidemics of typhoid which were rife in all the places at the time rapidly came to an end. He strongly recommends this method in places where the inhabitants fear or object to the hypodermic syringe.

ELDRIDGE (E. F.). **The Iodine Content of Michigan Water Supplies.**—*Amer. Jl. Public Health.* 1924. Sept. Vol. 14. No. 9. pp. 750-754. With 2 figs. [5 refs.]

The importance of the quantity of iodine in water is becoming recognized on account of the possible relation with goitre in a population. This paper deals with the subject in America. Two maps show the iodine contents of parts of the United States and the State of Michigan. We give the details of the estimation of iodine in water supplies in case it may be of use to those interested in water analysis.

"Method of Iodine Determination.—A chloride determination is first made on the raw water. Fifty litres of the sample are evaporated to a small volume after the addition of about six grams of normal sodium carbonate. If the chloride content is greater than about 60 or 70 parts per million, evaporation is stopped when a moist saline



mass is obtained. A considerable quantity of 95 per cent. alcohol is added to the evaporated solution and the mixture filtered. The residue is boiled three times with 95 per cent. alcohol, filtered, and the filtrates combined. Two or three drops of strong potassium hydroxide solution are added and the alcohol removed by evaporation. The residue is dissolved in a little water and the above repeated if necessary until the bulk of the chlorides are removed. If the chloride content is below 70 parts per million, the extraction with alcohol is omitted.

"The volume is adjusted to about 100 cc. in a 250 cc. glass-stoppered flask. If not already alkaline, 4 or 5 cc. of a saturated sodium bicarbonate solution is added. A solution of potassium permanganate (25 grams per litre) is added drop by drop until the permanganate colour persists. About 5 cc. of the permanganate solution is added in excess, and the flask placed in a dish of ice and the contents cooled below 10° C. Three cc. of carbon disulphide are then added and then 5 cc. of concentrated sulphuric acid, drop by drop, avoiding a rise in temperature. During the addition of the sulphuric acid the flask is shaken constantly to insure the iodine thus freed being taken up by the carbon disulphide.

"After the addition of the acid is complete, the excess permanganate is destroyed by a careful addition of hydrogen peroxide and the carbon disulphide drawn off by means of a separatory funnel. If the iodine is present in comparatively large amounts, small portions of carbon disulphide are added, thoroughly shaken with the solution, and drawn off until the extraction of the iodine is completed, or until the last portion of the disulphide shows no trace of pink.

"These portions are combined with the first extraction and the amount of iodine in the total determined colorimetrically by comparison with a standard carbon disulphide solution prepared by the same method from a solution containing a weighed amount of potassium iodide. A DuBoscq colorimeter with small cups can be used in the comparison of the colours.

"If bromides are present, a brown colour is imparted to the carbon disulphide, in which case a weak solution of potassium sulphocyanate is added, drop by drop, with constant shaking until the colour is removed or is replaced by the pink colour of the iodine. The presence of chlorides does not interfere with the determination.

"The above method gave accurate results to one part of iodine in a billion parts of water, meaning that the colour produced by amounts of iodine as low as .05 mg. in 1 or 2 cc. of carbon disulphide could easily be duplicated. As is true with most colorimetric analyses, the determination could be more accurately made in dilute solutions. Where amounts of iodine above 5 parts per billion were present, the volume of carbon disulphide was increased correspondingly."

GOODWIN (E. St. G. S.). **The Cockroach. 1.—Considered as a Possible Disseminator of Disease. 2.—Methods of Eradication.—***Jl. State Med.* 1924. Oct. Vol. 32. No. 10. pp. 470-478. [14 refs.]

The writer deals with the subject of cockroaches on naval ships. His remarks are not intended to apply to holds of cargo boats. He deals with the various remedies, all of which have been mentioned at one time or another in reviews in these Supplements.

The cockroach "is plentifully supplied with ectoparasites in the form of arachnoids and insectae. Its intestinal canal affords a home to many others. It possesses its own endamoeba, in its stomach wall a gregarine may be encysted, four species of infusoria may be found in the gut, and also four nematohelminths including an oxyuris.

"Of these parasites we know nothing, but that discovered by Fibiger of Copenhagen appears to be of great importance. Briefly stated, his investigations led to the detection of an hitherto unknown nematode, *Spiroptera neoplastica*, encysted in the muscle substance of *P. americana*. By feeding laboratory rats on cockroaches infested with this parasite, or on larvae isolated from the muscles, he induced gastric carcinoma in 50 per cent. of them.

"Apart from this, the cockroaches must act as a mechanical carrier of pathogenic organisms. Its activities in this direction are as possible as those of the common house fly. Moyell published the results of some investigations which showed that the common cockroach is able by contamination with its faeces to: (1) Bring about the souring of milk; (2) infect food with intestinal bacilli; (3) to transmit the tubercle bacillus when fed on human sputum containing this bacillus; (4) to transmit destructive moulds."

As regards remedial measures, he considers that the only method of getting rid of the pest is a thorough "Claytonisation" on three separate occasions. Clayton gas is perfectly effective in killing the adult or living cockroach, but nothing has any effect on the packets of cockroach eggs. Consequently it is necessary to allow time for all these to hatch out and to expose the young insects to the gas. Sodium fluoride is quite useless except in a very dry atmosphere, which it is practically impossible to obtain in a ship.

## WATER.

**METROPOLITAN WATER BOARD. Eighteenth Annual Report on the Results of the Chemical and Bacteriological Examination of the London Waters for the Twelve Months ended 31st March, 1924.** [HOUSTON (Alexander), Director of Water Examination.]—89 pp. With 15 diagrams & 35 photographs. 1924. London: P. S. King & Son, Ltd., 2 & 4, Great Smith Street, Westminster. [Price 15s.]

"*Barn Elms Experiments.*—There are nine primary rapid filters at Barn Elms, and they have been kept under observation since January, 1923. It should be explained that the main reason for their installation was to save the construction of new and costly slow sand filters by using the rapid filters to do, what may be called, the heavy work, thus enabling some of the existing slow sand filters to be worked more rapidly than usual.

"For the year ended March 31st, 1924, the slow sand filter beds Nos. 17, 18 and 19 receiving the combined filtrates from the primary rapid filters, were worked at 1.83, 2.52 and 2.75 instead of 1.19, 1.72 and 1.83 gallons per sq. ft. per hour, respectively.

"Eighty-one samples were collected during the year from these three filters (Nos. 17, 18 and 19) and 88.9, 85.7 and 88.5 per cent. of them contained no typical *B. coli* in 100 cc., which compares favourably with 73.1 per cent. from the West Middlesex Works as a whole.

"The Barn Elms reservoirs have always been a source of embarrassment, as the water is often so rich in 'plankton' that the filters fed with this water used to choke with great rapidity.

"As judged by laboratory tests, the primary rapid filters did excellent work in removing most of the growths and suspended matters generally. The resistance to filtration experiments indicated over a hundred per cent. improvement, and one has only to compare photographs before rapid filtration with photographs after filtration to realise the truth of these remarks. Moreover, Nos. 17, 18 and 19 sand filters had only to be cleaned four, three and three times during the twelve months, despite increased rates of filtration of about 54, 47, and 50 per cent. respectively . . . ."

Some interesting photographs are shown of sand particles at Barn Elms and Hampton Works. The appearance of the *clean* sand used for filling the primary filters Nos. 7, 8 and 9 at Barn Elms is contrasted with a batch of the same sand taken from filter No. 8 after it had been in operation for filtration purposes for a long time. The "mature" sand, though it had been thoroughly washed at the works in the ordinary way and rewashed carefully in the laboratories before being photographed, presents a furry appearance, which is very striking in comparison with the *clean* sand before subjection to any filtration process. Other photographs show some surface sand from a slow sand filter at Hampton after washing and careful treatment with alkalis and acids and further washings. The useful "fur of maturity" is seen to persist to a considerable extent, even after such treatment. Lastly, there is a photograph of some sand taken from immediately below the surface layer which is removed for washing purposes. Here again a protective surface film or "fur" has formed. The writer regards this "fur of maturity" as of great importance from the point of view of purification and "is desirous of creating the impression that the sand in the filter beds is not really dead matter, operating solely in relation to its physical properties as ordinarily understood, but so far as its surface area is concerned, a 'mature' and vital force producing effects not to be measured merely by the spaces existing between contiguous particles. The writer believes that the 'fur of maturity' is not only mechanically but vitally operative."

"*The Taste of Chlorinated Water.*—The difficulties of chlorinating some waters without giving rise to a taste are too well known to need description. Taste cannot be measured, and in many cases when there is no appreciable taste there may be a latent one lurking, so to speak, in the background, and only waiting for some slight alteration in the conditions to become at once apparent.

"The ability to detect with delicacy a taste in waters is a natural gift, one might almost say it cannot be acquired. It requires, to be really useful, long experience, good judgment and a retentive memory. The observer who can anticipate complaints by detecting the dawn of taste troubles before they have become appreciable to others is worth a great deal.

"It is useful sometimes to review our knowledge, or lack of knowledge, of this important subject. There are three fairly distinct tastes, chlorinous, iodoform (chemist's shop flavour), and a third which drifts into a number of channels and may be called the 'indeterminate' taste. Earthy, mouldy, damp straw, froggy and bricky are some of the terms applicable to the 'indeterminate' taste. Some think they all merge into each other and are one and the same,

others regard them as practically distinct. The latter can often use their tasting abilities and memory with telling effect, and say, perhaps—this is the same mouldy taste we had three years ago with such and such a water. Untreated waters may have them to some extent, but usually it requires the presence of chlorine as well to draw out their characteristics.

“ Let us take the *chlorinous* taste first. If you add enough chlorine to a water, say two or three parts per million, the taste is frankly and solely chlorinous ; or if there are other tastes as well they are completely subordinated. It is decidedly unpleasant, but not probably so nauseating as the iodoform taste. The more chlorine you add the more insistent the taste naturally becomes, but the more certain is it that the iodoform taste is avoided. If the dose is pushed to 100 parts in 1,000,000 the water is undrinkable and simply reeks of chlorine, yet after de-chlorination it becomes immediately tasteless—that is in the laboratory, for it is impossible to be quite certain that under practical outside conditions the same necessarily applies. Super-chlorination and de-chlorination methods have yet to be tried under all the variable conditions which might arise (*e.g.*, before and after filtration), and with all classes of water before we can be positive on this point. Nevertheless, so far as we can judge by laboratory and, to some extent, outside experiments, the only danger of super-chlorination and de-chlorination is lack of boldness in pushing the treatment far enough. Boldness is indeed the best antidote to taste troubles.

“ If the writer had to give an Eastern potentate, with the powers of life or death in his hands, a drink of chlorinated water, he would choose a dose of 10, if not 100, parts per 1,000,000, and de-chlorinate rather than risk much smaller doses and iodoform taste and highly unpleasant if not fatal consequences. Frankly, however, it is unsafe to generalise from experiences gained chiefly, although by no means entirely, in the laboratory, as to what would inevitably follow in actual water-works practice.

“ Permanganate does not remove a chlorinous taste ; on the contrary, the tendency would be to render it more pronounced. Permanganate is in some ways a double-edged sword. It has *per se* an objectionable taste, and unless used with great discretion may actually augment taste troubles. Speaking generally, a chlorinous taste is simply a taste of chlorine, and not a taste produced by the action of chlorine on other substances.

“ Passing next to the *iodoform* taste, we have here to face a host of perplexing factors. It is apt to be associated with minor doses of chlorine, but shows a tendency sometimes to merge into the chlorinous taste. Still, in the main, it is quite distinct, and can be removed by substances (*e.g.*, permanganate) which do not destroy and may increase the chlorinous taste. It seems to be produced by the action of chlorine on substances about which little is known. By filtering water through a Berkefield filter, or by the addition of traces of phenol bodies the water may be so modified as to re-act with chlorine in such a way as to produce with tolerable certainty an iodoform taste. Waters containing very little oxidisable matter (*e.g.*, well water) appear to be specially sensitive, so that it cannot be said that it is merely a question of chlorine acting on organic matters. There may be no taste at a Works, or in the large mains, yet at the periphery of the system of supply crops of quite genuine complaints may arise.

"Some years ago, Dr. Snell, of Coventry, showed the writer the results of some ingenious experiments in which a chlorinated but tasteless water acquired a taste when various substances were placed in it (e.g., portions of lead pipes and other water fittings taken from actual houses). A chlorinous taste can be instantly removed by a de-chlorinating agent, but the iodoform taste is not modified by such treatment. Permanganate can usually be relied upon to prevent its formation, or to remove it when it has actually occurred. Permanganate can be added successfully before or after chlorination, and either before or after filtration. Nevertheless, if the permanganate has been used up and the water still contains free chlorine, the chlorine may apparently act on fresh substances to produce the iodoform taste again. If permanganate is added previous to and chlorine after filtration, an iodoform taste may result, judged by experiments in the Laboratory. That is, the permanganate apparently cannot under these conditions so alter a water that it can never develop the iodoform taste when subsequently treated with chlorine. Chlorine in excess can also prevent, or remove, an iodoform taste, and if de-chlorination is practised, there is no taste of chlorine.

"Here, again, it might be imagined that if the iodoform taste were killed, so to speak, by means of chlorine, and then the water nearly, although not quite, fully de-chlorinated, that any trace of chlorine still left could not possibly create a subsequent iodoform taste. Yet, cases have been known when the distribution of such a water led to an iodoform taste peripherally, presumably through the chlorine encountering fresh substances capable of being acted upon so as to produce the iodoform taste.

"Lastly, as regards the '*Indeterminate*' taste, we are here on very uncertain ground, because we are dealing with tastes very similar to those which occur in untreated waters. They are not so common, or perhaps so objectionable, as the iodoform taste, and although some of them can be removed, or obviated, in much the same way, it must be confessed that others are of a most intractable character.

"The Board's Works were not designed for post-filtration chlorination methods, and, generally speaking, ante-filtration processes are alone permissible, but there are certain advantages in chlorinating subsequent to filtration. If carried out before filtration, the filter beds may be unsuspectingly *adsorbing* taste-imparting materials, with the production subsequently of a long-drawn-out train of taste troubles.

"If the treatment is carried out subsequent to filtration there is no aftermath. If a taste develops and is corrected, only the water in the distributing system is implicated, and a few hours should suffice to put matters right. Nevertheless, it is possible, or even probable, that, in certain cases where the taste is latent, incipient, or barely appreciable, the filtration process may just succeed in eliminating it; so it would be utterly wrong *unconditionally* to approve all post-filtration and discredit all ante-filtration chlorination processes. Moreover, there is irrefutable evidence that some waters are *more* susceptible to taste *after*, as compared with *before* filtration. The writer thinks that there is no royal road which avoids all taste troubles in all circumstances, and that each particular case should be judged on its own merits. It may be said, why not give a dose so small as to avoid chlorinous, iodoform and '*indeterminate*' tastes? The answer is, that you are running the almost certain risk of not sterilising the water satisfactorily at all. The writer thinks that at some places

this is what actually occurs, and at others, the fear of it happening leads to a tightening of the dose just sufficiently to make it almost certain that the iodoform taste will develop.

"The foregoing notes show some of the difficulties of the subject, and perhaps they also indicate certain ways of avoiding taste troubles.

"There is one thing certain, and that is, although we have gradually gained most valuable experience, *further knowledge is urgently required.*"

MOM (C. P.). **The Taste and Smell of Drinking-Water sterilised by Chlorine.**—*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1924. Part III. pp. 249-270. [14 refs.]

This paper contains a very exhaustive account of the occurrence and treatment of tastes and odours in drinking waters, whether of natural origin or arising from chlorination, and deals with many which occur only in tropical countries. Naturally, the writer makes many comparisons with the work done by Sir Alexander Houston on the same subject. One substance he describes as follows :—

"Again, there is still another substance which we meet with especially in the water of East Indian rivers which carry with them so much mud, washed down by rain water from the earth's surface; this is the substance carrying the smell of earth. This substance which was isolated in the year 1895 by Rullmann from pure cultures of *Actinomyces odorifera*, and which is also produced by other micro-organisms belonging to the Streptotrichea—e.g., the *Streptothrix chromogena*, described by Beyerinck—is a volatile insatiate carbonyl which can be detected by its taste and smell, even in extremely small quantities. It comes into being during the formation of the humus, and therefore occurs exclusively in the topmost layers where this process takes place."

He makes use of ordinary chlorine from cylinders and a substance "caporit," which is described below.

"Another method of sterilisation by chlorine which is very promising for the future is that by means of *Caporit*. This preparation, put into the market by the firm Bayer (Griesheim-Electron), contains calcium hypochlorite and has then, in its chemical composition, a resemblance to bleaching powder; but, unlike the latter, it keeps well and in its practical utility leaves nothing to be desired. This preparation contains  $\pm 70$  per cent. of so-called 'active chlorine,' is easily soluble, and its dosage is very simple, so that the use of this compound offers diverse practical advantages over the use of chlorine gas. It is certain that, next to chlorine gas, it will take an important place in chlorine sterilisation. Further on we will return to the use of caporit."

Those interested in water analysis abroad should obtain the original paper; the experiments are too long to describe here. The conclusions, however, are given :—

"1. The Tjiliwong water at Manggarai has naturally more or less of a strong taste and smell, which at best can be described as 'muddy.'

"2. A matter having identically the same smell is produced by different kinds of streptothrix, such as the *Streptothrix chromogena*

and the *Actinomyces odofera* [sic]. This matter occurs in the superficial layers of the ground and very probably is washed down into the river together with mud, by rain water.

"3. In the Tjiliwong water there is nothing to be seen of the influence of algae or the growth of diatoms.

"4. Water having this muddy taste and smell is unsuitable for chlorination alone, even because a minimum dose of chlorine has a very unfavourable influence on them.

"5. An exact coagulation of the colloidal mud present in the river water contributes greatly towards the elimination of the substance causing the muddy smell.

"6. Since this smell-producing substance as a rule is not found in water which comes from somewhat deeper strata, e.g., in well and in spring water, there is a certain parallelism to be expected between this substance and a nitrite which disappears in the lower strata, and is oxidised to a nitrate. It is to be supposed, as the smell giving substance is organic in kind, that it is converted by a process of oxidation, just like the nitrite, in the same zone underground where the oxidation of the nitrite has taken place.

"7. This hypothesis is confirmed in so far as the addition of oxidising matters to the water contributes to the elimination of the substance causing smell.

"8. In this capacity, potassium permanganate, in a dose of 0.5 mgr. per litre, is the most satisfactory (1 Kg.  $\text{KMnO}_4$  costs about 1s. 8d.,—the expense, then, for 1 cubic metre of water is 0.01 of a penny).

"9. The stronger taste and smell which arises in chlorination can still continue in over- and anti-chlorination. Oxidation of the substance with the muddy smell, by means of over-chlorination, gives no gratifying results.

"10. The substance with the muddy smell being volatile, aeration contributes to its expulsion. In the experiments described here, aeration after filtration was sufficient. Eventual aeration, also before filtration, would probably have a favourable effect. In this respect, it may be mentioned that manufacturers of chlorine gas apparatus place on the market 'aerators' or 'desodorisers.' Of these, Patterson (England), Wallace and Tiernan (America), and Triton-Ornstein (Germany) may be quoted. Aeration alone, however, is in many cases, unsatisfactory."

LONGLEY (F. F.). **Chlorine as a Criterion of Impurity in Water. An Australian Variation from Accepted Principles.**—*Health*. Melbourne. 1924. July. Vol. 2. No. 4. pp. 110–116. With 1 chart in text.

Nowadays, as chlorine is used for sterilization purposes, we think it would have been better if the term "chlorides" had been used in this article instead of "chlorine." The writer quotes the work done by the Massachusetts Board of Health on the chlorides contained in the water in certain States of America; the quantity found varied with the distance from the sea. Similar work has been done in

Australia, and the results were extraordinarily erratic. The main discussion turns on the query how it comes about that these high chloride figures are obtained in rain water some distance inland. This is a meteorological problem, and not a sanitary one at all. The significance of chlorides in a water supply is so difficult to estimate that it is not used much by most water analysts.

CUNNINGHAM (J.) & RAGHAVACHARI (T. N. S.). **Note on the Appearance of a Violet Producing Organism in Certain Water Supplies of the Madras Presidency.**—*Indian Jl. Med. Res.* 1924. Apr. Vol. 11. No. 4. pp. 1285–1289. [1 ref.]

The writers describe the chromogenic bacteria occasionally found in the Madras waters which produce a violet colour. The microscopical appearance, staining properties and culture tests are given in detail; those requiring them should refer to the original paper. The most interesting fact from a general point of view is that these bacteria made a simultaneous appearance in three places in the Madras Presidency many hundred of miles apart. Further, the bacillus persists in these various supplies and has been isolated on several subsequent occasions.

This phenomenon has never been explained. The same thing was reported by the reviewer and his collaborators in 1908, when at one season of the year a large number of the water supplies in the Presidency contained bacteria which fermented inulin; they disappeared as rapidly as they came. Other incidences could be enumerated.

PUBLIC HEALTH REPORTS. 1924. Nov. 7. Vol. 39. No. 45. pp. 2788–2791.—**Some Specific Factors responsible for Pollution or affecting Analyses of Water Supplies.**

This list of factors was originally (1922) submitted by Mr. H. A. WHITTAKER to the sub-committee on field surveys of the Advisory Committee on Official Water Standards of the U.S. Public Health Service. Though naturally it contains much that is well known, it may be of service to those employed in the supervision of water supplies.

#### A. SOURCE OF SUPPLY.

“ *Surface and underground supplies :*

“ (a) The selection of water supplies without complete hydrographic and sanitary data.

“ (b) The location of waterworks, including pumping station, treatment plants, reservoirs, etc., where they are subject to flooding with surface water from lakes, streams, and other sources, or where satisfactory drainage cannot be established away from the plant on the ground surface.

“ *Underground supplies :*

“ (a) The presence of sewers, cesspools, wells used for the disposal of sewage and surface drainage, etc., in close proximity to the source.

“ (b) Excavation work in the immediate vicinity, especially where explosives are used, which would result in disturbance of the underground formations.



"(c) Defective casings resulting from incorrect design or construction and the deterioration of materials. The tops of drilled-well casings are frequently fractured during the process of removing the drop pipe and cylinder for repairs.

"(d) The lack of covers to wells and springs, or the improper design and construction of covers, especially of dug wells and springs, and of the caps for casing of drilled and driven wells.

"(e) The location of pumps and pumping equipment in a pit immediately over or adjacent to the well or spring casing where such design and construction could be avoided. Such pits act as catch basins for drip water from the pump and piping, and sometimes for surface water which may enter the pit through defective side walls or covers where pumps of the deep-well type are used. Unless provision is made for proper removal of this water, it may accumulate to a sufficient extent to flood the casing head or the pumping equipment, thus endangering the supply.

"(f) The construction of drains leading from a well or pump pit to a sewerage or drainage system. Such drains establish a direct connection between the water supply and a source of pollution.

"(g) Inadequate protection of air vents from wells using air-lift pumps.

#### B. TREATMENT.

"*Surface and underground supplies :*

"(a) The design and construction of water-treatment plants, including filtration plants, chlorine plants, and water-softening plants, without adequate knowledge of the microscopic, bacteriological, physical, or chemical condition of the water to be treated, or sufficient preliminary experimental data to demonstrate the proper type of plant to install.

"(b) The installation of only a part of the treatment necessary to purify the water properly. This is especially true where chlorine treatment has been recommended when filtration should have been a part of the treatment to ensure satisfactory results.

"(c) The improper design or construction of settling basins, coagulation basins, filters, piping, and apparatus for administering chemicals.

"(d) The existence of by-passes around all or a part of the water-treatment plant by which untreated, or partially treated water, can be discharged into the distribution system.

"(e) A lack of duplicate parts of machinery and apparatus involved in the treatment of the water, and necessary to keep the plant in operation in case of accidental breakdown. This applies especially to chlorine apparatus.

"(f) The intermittent discharge of sewage and trade wastes into the source of supply, placing an unusual burden on the treatment plant at irregular intervals.

"(g) Defects in the design and construction of water-softening plants that expose the water under treatment to possible pollution, especially through the application of the chemicals.

#### C. PUMPING EQUIPMENT.

"*Surface and underground supplies :*

"(a) The use of a type of pump of unsatisfactory construction, as, for example, one which would require a well pit around the well at the

surface when another type of pump would have obviated the necessity of such construction, or the use of one which requires priming when put in operation, or which requires the attendant to enter the well for the purpose of oiling.

“(b) The return of water used for cooling engines or pump bearings into the supply.

“(c) The improper location of intakes to air compressors which would result in pumping dust-laden air into a well operated on the air-lift principle.

#### D. STORAGE.

“*Surface and underground supplies :*

“(a) The lack of covers to prevent contact with persons, animals, birds, insects, dust, etc.

“(b) The use of the covers or surfaces of underground reservoirs for pleasure purposes, such as play-grounds, tennis courts, skating rinks, etc.

“(c) Faulty construction of walls and roof.

“(d) Manholes in the roofs constructed without collars, permitting the entrance of surface water, and the use of covers without overlapping edges.

“(e) The use of improperly constructed vents in the roof, permitting the entrance of small animals, birds, insects, dust, etc.

“(f) The improper design of drainpipes and overflow pipes which would allow the backing up of sewage or other polluted material from a sewerage or drainage system to which the drain or overflow is connected.

“(g) Passing water pipes carrying polluted water through a storage reservoir, or a clear-water basin of a filtration plant, thus creating a possible opportunity for polluting the supply in case of leakage.

#### E. DISTRIBUTION.

“*Surface and underground supplies :*

“(a) The existence of cross connections between the distribution system and another water supply which is unsafe.

“(b) Connections with mechanical equipment receiving and returning water to the system.

“(c) Plumbing fixtures which allow water to return to the system from polluted sources during periods when there is a negative pressure in the system.

“(d) Connections between the distribution system and the bottoms of elevated water tanks where such tanks are subject to pollution.

“(e) The practice of connecting fire engines with the distribution system and pumping water from polluted sources into the system for fire-fighting purposes.

“(f) The laying of water mains in the same trench with sewers, the water mains being laid at a lower elevation than the sewer pipe. This adds unnecessary danger in case breaks occur in the water system and it is necessary to drain the pipes for repair. If leakage occurs in the sewer pipe, or if it is accidentally broken during excavation, there is opportunity for sewage to enter the water mains.

## F. OPERATION.

*"Surface and underground supplies :*

"(a) The operation of water works by inexperienced operators with little or no knowledge or appreciation of sanitation.

"(b) Careless operators who do not observe difficulties, and who do not repair breaks in equipment, including well casings, suction pipes, pumps, chemical feed apparatus, chlorine apparatus, etc.

"(c) The operation of water supplies without analytical control. This applies especially to water-treatment plants.

"(d) Neglect to disinfect any part of the system handling pure water after repair work on wells, pumps, piping, filters, clear-water basins, reservoirs, tanks and distribution system, etc."

BROWNELL (O. E.). **Protection of Small Water Supplies used by Railroads.**—*Public Health Rep.* 1924. Sept. 5. Vol. 39. No. 36. pp. 2283-2292. With 9 figs.

The pictures (Figs. 15-22) attached to this most excellent article explain themselves. Examples are given of defective well structures, with suggestions for remedying the evils.

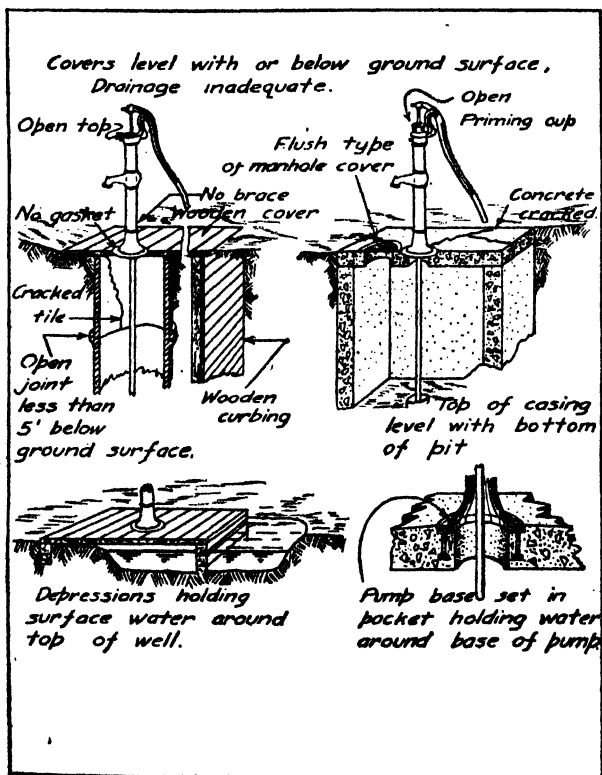


Fig. 15.—Some defects frequently found in well covers and pumps.

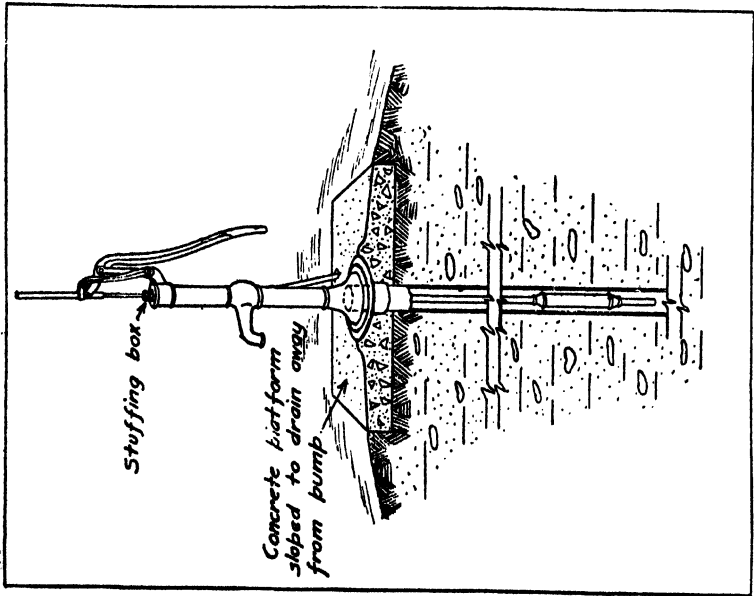


Fig. 16.—A properly constructed drilled well.

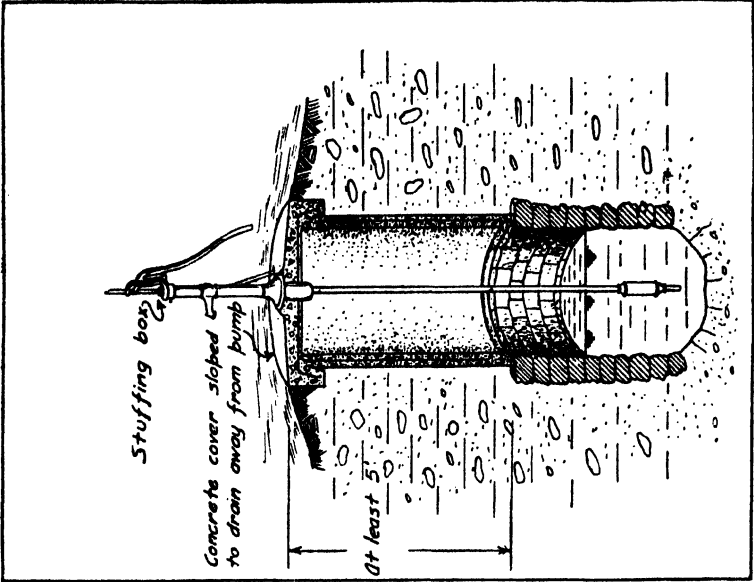


Fig. 17.—Properly reconstructed dug well.

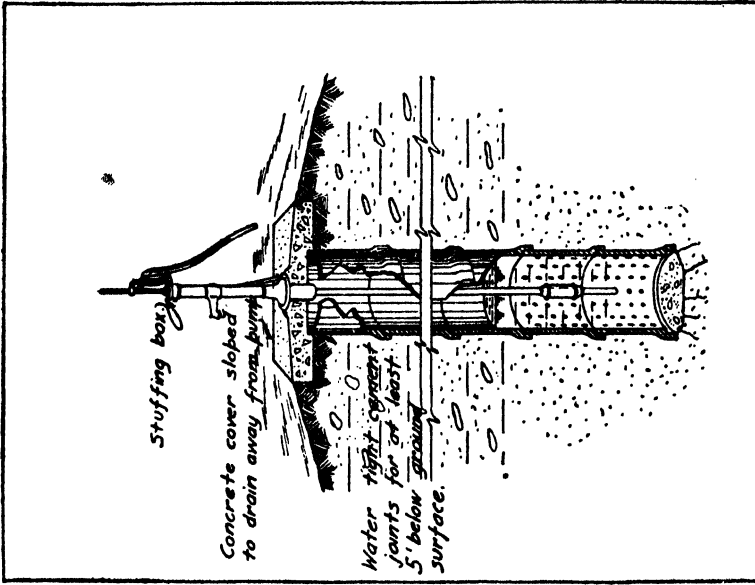


Fig. 19.—Properly constructed bored well.

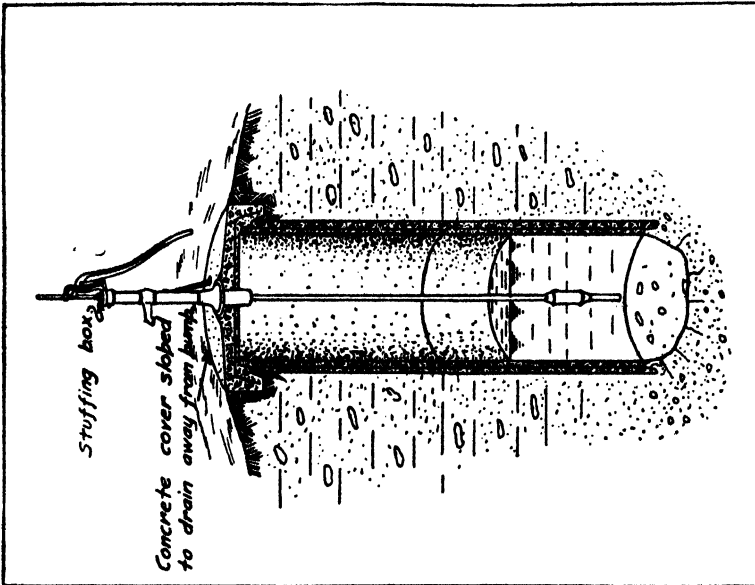


Fig. 18.—Properly constructed dug well.

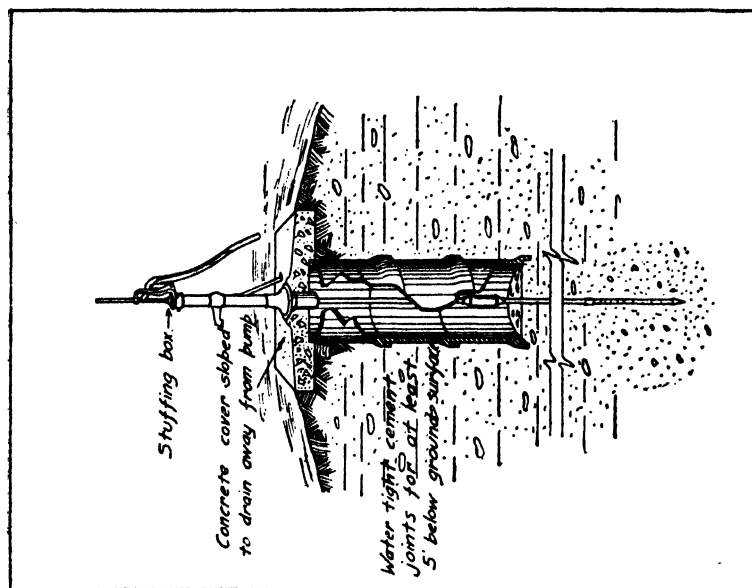


Fig. 21.—Properly constructed driven well.

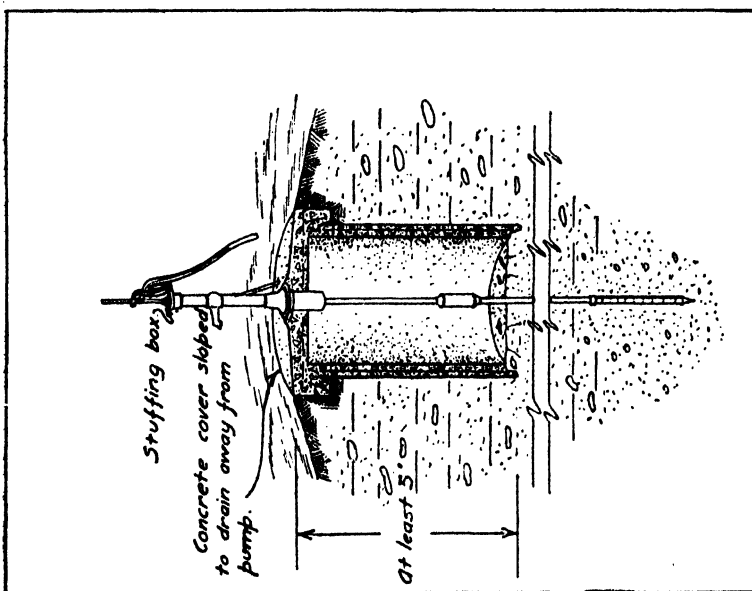


Fig. 20.—Properly constructed driven well.

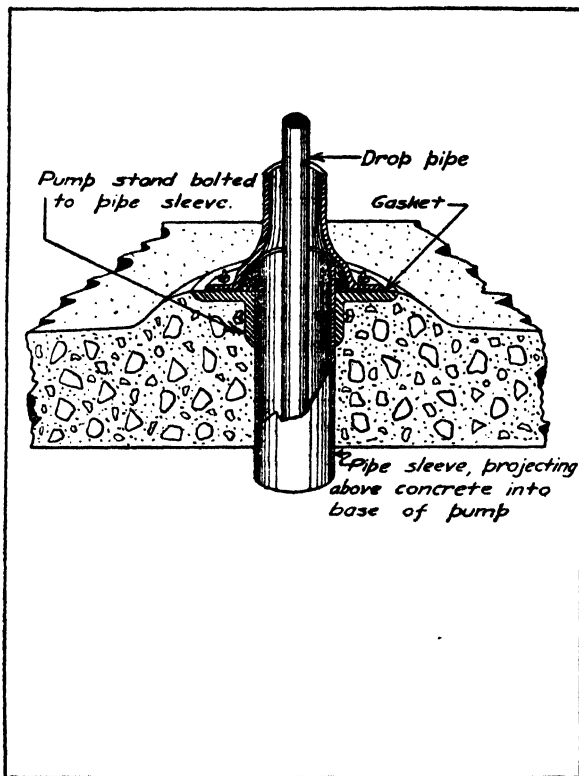


Fig. 22.—Detail of construction at base of pump.

[Figures 15 to 22 are reproduced from *Public Health Reports*, Washington.]

HOOVER (Charles P.). [**Mixing Devices and Reaction Time.**]—*Jl. Amer. Water Works Assoc.* 1924. May. Vol. 11. No. 3. pp. 582-597. [Summarized in *Public Health Engineering Abstracts*. 1924. July 26. J.-848.]

“Water treatment experiments were made in 1923 at Columbus, Ohio, water works plant to determine: (1) Velocities required to keep the precipitated chemicals in suspension; and (2) the effects of short and long periods of mixing and agitation. A turbid water was used with aluminum sulphate only, and also a hard water, with lime, soda-ash and alum treatment. The results of plant operation and the laboratory experiments indicate the following:

“1. Results of plant operation and laboratory experiments indicate that velocities of 0.3 foot per second do not provide sufficient agitation for treatment of turbid water or for water softening, but that the velocity does not need to exceed 0.6 foot per second.

“2. Coagulation results obtained on turbid water at velocities of 0.6 foot per second may be obtained at lower velocities only by adding an excess amount of coagulant.

" '3. A short mixing period of twenty or thirty minutes at 0.6 foot per second velocity is more effective than a mixing period of one and one-half hours at 0.3 foot per second velocity.

" '4. Mechanical agitators are less expensive to build, more compact, obviate the necessity of lifting the water the extra two or three feet necessary to pass through baffled mixing tanks and provide greater flexibility and accessibility.

" '5. Temperature is a more important factor in water softening than time.

" '6. Waters containing magnesium salts are more difficult to soften than waters containing only calcium, magnesium carbonate being especially hard to remove.

" '7. Magnesium salts may be precipitated by overtreatment with lime.

" '8. By overtreatment with lime, then neutralizing the excess lime with sodium carbonate, waters having a hardness of 572 to 1,044 parts per million may be reduced to a hardness of less than 30 parts per million, or less than 2 grains per gallon.

" '9. If it is not desirable to use excess treatment, better water softening results are obtained by split treatment than by the ordinary method of applying all the chemicals to all the water under treatment.'

" Professor Langelier, of the University of California, in a discussion of this paper, refers to results of experiments and tests at Sacramento and other California filtration plants. His experience indicates that temperature alone does not have an important effect on coagulation of water with alum."

BASTIN (E. A.). **A New Pump or Liquid Elevator.** [Correspondence.] — *China Med. Jl.* 1924. June. Vol. 38. No. 6. pp. 529-530.

The Rev. E. A. Bastin strongly recommends a pump called the "Chaine-Helice Patent Liquid Elevator," which has been improved by Messrs. Boulton & Paul, Ltd., of Norwich, and put on the market as the "Boulton Water Elevator (Caruelle Patents)." We have written to this firm direct and give here for the benefit of those interested in this subject some pictures and diagrams illustrating the essential principle of the Caruelle Cells as used in this water elevator.

Figure 23 shows the formation of the Caruelle Cells, which are made in a continuous line or lines on an endless driving band which passes over a pulley at the well-head and under a heavy pulley wheel below the surface of the well-water. The Caruelle Cells are so shaped and proportioned as to allow water freely to enter them when the driving band passes through the well-water at high or low speed. The water they take up is retained by surface tension so long as the direction of the driving band remains in a vertical line, even though it is stationary. When the band is tilted from the vertical, as in passing over the top pulley, the water is released from the cells by centrifugal force, which breaks down the surface tension. By fitting a tank under the top pulley as shown in Figure 24, the released water is caught and prevented from returning to the well.

Figure 25 shows a portion of the band fitted with Caruelle Cells held vertically and filled with water from a vessel into which it has been dipped; figure 26 shows the band held at an angle and the water running out.



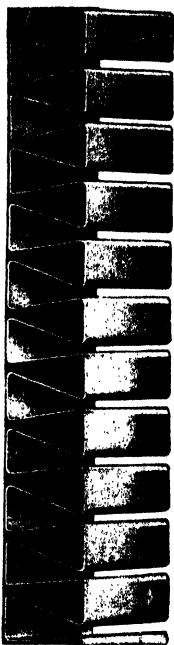


Fig. 23.—Showing formation of the Caruelle cells.

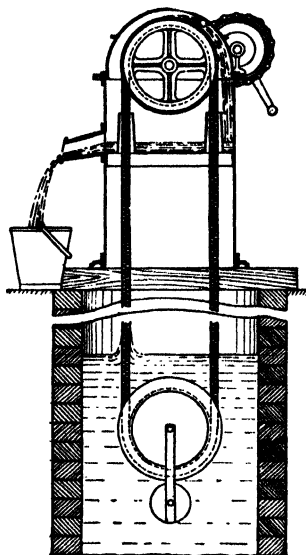


Fig. 24.—Diagram of elevator head used with Caruelle bands.

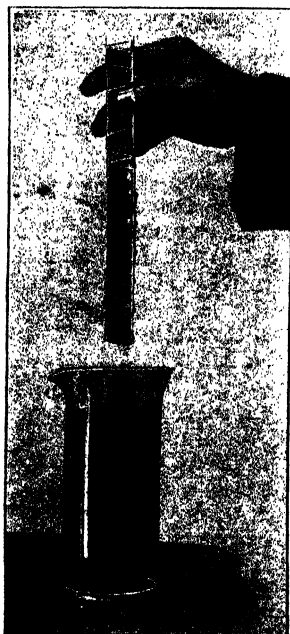


Fig. 25.—Showing a piece of Caruelle band filled with water which it has picked up from the beaker.

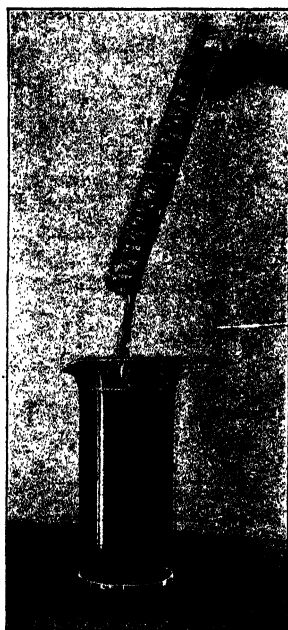


Fig. 26.—Showing the water running out of the cells when the band is held at an angle.

[Figures 23 to 26 are reproduced from blocks kindly lent by Messrs. BOULTON & PAUL, Ltd., Norwich.]

## FOOD.

SMITH (Wm.). [**Urban Milk Supply in India.**—*Local Self-Govt. Gazette*. 1924. May. Vol. 10. No. 5. pp. 166–167. [Summarized in *Public Health Engineering Abstracts*. 1924. Aug. 16. J-868.]

“The author discusses briefly the insanitary and filthy conditions of the milk supply in the larger cities of India. The milk offered for sale is so unsafe that practically every consumer is forced to boil it. The cows are housed within or very close to city limits. Space is restricted for grazing or proper exercise. The back lanes of Bombay, Madras and Calcutta, where the bulk supplies of these cities is produced, are very insanitary and filthy.

“The author states ‘that the Indian milk supply must be produced under natural conditions on the farms where the cattle are kept, remote from the cities. It must be pasteurized, cooled and railed to the cities and there sold under sanitary conditions to the public, and until this system is introduced there is little hope of any permanent improvement.’ The Governor of India, realizing that the need of the dairy industries in India is technical knowledge and business organization, has provided an up-to-date dairy institute at Bangalore. All interested in the milk question are urged to attend this institution.”

## CONSERVANCY.

KHALIL (M.). **The Relation of Sewage Disposal to the Spread of Helminth Infections in British Guiana. (A Report of the Filariasis Commission in British Guiana.)**—*Jl. Helminthology*. 1924. Sept.–Nov. Vol. 2. Nos. 4 & 5. pp. 175–190. With 8 figs. [11 refs.]

Dr. Khalil describes the pit latrine, the pail closet, the latrine erected over drainage trenches, and the septic tank, all of which are in operation in British Guiana. An examination of pit latrines, whether in use or filled in, revealed helminth ova; in the recent deposits were hookworm larvae and eggs, in the abandoned pits hookworm was absent, and it is suggested that the larvae had migrated into the adjacent soil. Pit latrines are also dangerous as breeding-grounds for flies, as allowing sewage to percolate and pollute neighbouring streams, as liable to flooding, and as subject to the depredation of pigs and poultry. He acknowledges, however, that the pit latrine is an important advance on promiscuous defaecation. The pail closet is not much used in British Guiana.

Latrines erected over drainage canals, a common method in the canalized coast lands, have several disadvantages: excreta collect in the dry season, and are subject to the attention of flies and domestic animals; the ova of parasitic worms are deposited along the bank and have every chance of maturing; in heavy rains the canals overflow and pollute the neighbouring soil; in countries other than British Guiana (which is bilharzia-free) the spread of bilharziasis is favoured. Helminth eggs were not found in water from such trenches, and it has been suggested that dilution kills them. The determining factor in development, however, is access of oxygen. Looss suggested that larvae in water soon sink to the bottom, and therefore the drinking of open water is not a risk. Khalil suggests that the heating of the upper

layers by the sun enables the mature larvae to travel to the surface. It is concluded that it is unsafe to allow human excreta to drain into open trenches.

The septic tank has been considered an ideal solution of the sewage problem in the tropics, and has been credited with the destruction of hookworm eggs. A high percentage of the population harbours hookworm, and examination of septic tank effluents and deposit on 15 occasions revealed hookworm eggs which, put under favourable conditions (Petri dishes), developed. Active hookworm larvae, differentiated from free-living forms, were obtained in drains 18 to 20 feet from the septic tank from which samples of effluent were taken, and in these drains children paddle or fish. The delay in development in the tanks is due to want of oxygen. Tanks draining quarters used by Europeans gave no ova, but in 3 other instances over 2,000 *Necator* eggs per gallon were counted. A table for 18 tanks gives the capacity, number of adults served, eggs of *Necator*, *Ascaris* and *Trichocephalus* per gallon, other organisms in tank scum and oxygen absorbed. The author's conclusions are as follows:—

“Sewage disposal has been considered in England and Europe chiefly from the point of view of bacterial infection, particularly as regards the Enteric group of organisms. The Protozoal and Helminthic infections, propagated by faecal contamination, have received no attention. In text books on Sanitation and Hygiene, the entozoal parasites of man are dismissed in a few lines, mostly incorrect and copied from one edition to the next without keeping pace with the rapid progress in Tropical Medicine. There is a tendency in England to dissociate sanitation and hygiene of warm climates from that of cold climates. With the facilities of communications now available this distinction is unjustifiable. Tropical diseases are being introduced into colder climates and *vice versa*. Moreover, this country contributes a high percentage of the medical men and sanitarians located throughout the tropics. They are apt to copy what is done or what they were taught in England, neglecting new factors appearing in their new environment. It is surprising that in British Guiana and elsewhere sanitarians have diligently made cultures to isolate *B. typhosus* and other organisms from drinking water and sewage effluent, and were totally unconscious of the presence of the comparatively gigantic ova of hookworm and other parasites. In tropical countries the disasters brought about by hookworm disease often surpass those due to bacterial infections. Hookworm disease retards the development of children, handicaps their mental capacity, deteriorates the value of adult manual labour, predisposes the community to various diseases, and, in addition, claims a grave toll of mortality.

“It is not to be concluded that bacterial investigation of water and sewage effluents is unimportant, but it is claimed that protozoal and entozoal infections must receive due attention as well.

“Bacterial purification of sewage is apparently inefficient as regards helminth ova. It is unjustifiable to turn the effluent from such installation into rivers or canals, which are used for drinking purposes, as is the routine in England. It should be kept in mind that filtration is inefficient in excluding hookworm larvae which are capable of passing through several layers of filter paper and can penetrate the human skin. Sewage farms ought not to be encouraged in the tropics, as they act as veritable concentrated cultures of hookworm larvae. One cannot wholly condemn these methods of sewage disposal, because

so far there is nothing better to replace them. It is only urged that their limitations must be kept in mind till further research and observations rectify their defects."

FAUST (Ernest Carroll). **Some Facts regarding the Relation between Nightsoil Disposal in China and the Propagation of Helminthic Diseases.**—*Amer. Jl. Trop. Med.* 1924. Nov. Vol. 4. No. 6. pp. 487-501. With 1 plate.

It is unnecessary to do more than refer to the account here given of the Chinese methods of collecting human excrement, which in China, as is well known, is all carefully treasured for manure. In the author's opinion communicable organisms passed in this otherwise valuable material are responsible for most of the disease of China and the Far East. The author, however, here deals only with disease due to helminth infections. He gives details of the species of helminths infesting man in China, and also some particulars of some of the chemical solutions which destroy eggs that do not contain resistant larvae; but as such chemicals are not generally applicable to manure, we may pass on to his practicable recommendations for meeting the danger of helminth infections through the use of night-soil for agricultural and horticultural purposes, not only in China, but wherever the Chinese market-gardener has established himself.

Garden produce may be contaminated by direct contact with such manure, as also may water; no treatment is feasible other than adequate boiling. Where hookworm and schistosome larvae exist in the manure, since the labourer works in the stuff with bare legs, the original faeces should, if possible, be sterilized; and the only suitable method of sterilization at present to be suggested is thorough mixing of the faeces with the urine and allowing sufficient time for the mixture to ripen. Furthermore, in limited areas, where important "reservoir" animals are not present, hookworm (and also Fasciolopsis) infestation can be treated with carbon tetrachloride, and schistosome infestation with antimony tartrate. Theoretically, the discovery of some effective and non-deleterious method of sterilizing night-soil and the universal diffusion of appropriate knowledge would dispose of the danger of helminth infection. These certainly are counsels of perfection; experience would incline to regard the "educational" remedy as counsel of despair, though the author almost persuades himself to be hopeful.\*

PEARSE (Langdon). [**Dewatering Activated Sludge.**]*—Public Works.* 1924. Aug. Vol. 55. No. 8. pp. 262-264. [Summarized in *Public Health Engineering Abstracts.* 1924. Aug. 2. J-863.]

"This article is from a paper presented to the International Conference on Sanitary Engineering held in London July 7, 1924, and describes apparatus and methods employed in the United States, and the results obtained in operating and test plants.

"The difficulties of dewatering activated sludge are chiefly due to : (1) The physical condition of the solids, which retain very tenaciously the water; (2) the large volume of sludge to be handled; and (3) the importance of removing practically all the solids from the sludge.

"Briefly, the problem is to take a sludge containing from 98.5 to 99.5 per cent. water and reduce the water content to 80 per cent. or

\* Summarized by Lt.-Col. A. ALCOCK.

less, the resulting cake being then heat-dried to a moisture content of 10 per cent. Various types of apparatus of treatment have been tried. These may be classified as follows :—

" *Primary Removal of Water.*—1. Air drying on prepared sand beds. 2. Filtering: (a) Through fine wire mesh (Machlachlan); (b) through filtros plates; (c) through absorbent material. 3. Filtering with aid of additional pressure: (a) Hydraulic pressure applied to liquid; (i) chamber of leaf filter press; (ii) Kelly filter; (b) hydraulic pressure applied to bags; (i) Worthington; (ii) Berrigan; (c) vacuum filters; (i) rotary leaf or American; (ii) rotary drum of Oliver. 4. Centrifuge; (a) intermittent; (b) continuous. 5. Flotation. 6. Spraying (Bailey).

" *Secondary Removal of Water.*—1. Rotary Heat Dryer; (a) direct; (b) direct-indirect; (c) steam. 2. Travelling Belt Dryers.

" Activated sludge de-watering is not so much a problem of finding suitable machinery as it is of properly conditioning the sludge itself. By conditioning is meant both the control of the activated sludge process as well as any supplementary treatment given by adding chemicals with or without heat."

SURVEYOR & MUNICIPAL & COUNTY ENGINEER. 1924. Oct. 24. Vol. 66. No. 1710. pp. 343-344.—**Sewage Purification at Manchester. Operation of Activated Sludge Units: Rivers Department's Annual Report.**

" Small Unit.—This unit has been in continuous operation throughout the year, with the exception of a short period of five days, when the flow of sewage to the plant was stopped to permit of the construction of a new sewage carrier, etc.

" A total volume of 128,215,000 gallons of sewage has been dealt with at the average rate of 357,000 gallons per day, with an average air consumption of 1.08 cub. ft. free air gallon of sewage treated.

" The average analytical returns, etc., for the year are tabulated below :—

SMALL UNIT: RESULTS IN GRAINS PER GALLON.

		Screened and Detritus-free Sewage.	Effluent.
Four hours' oxygen absorption	... ..	2.63	.45
Three minutes' oxygen absorption :—			
Before incubation	... ..	.88	.18
After incubation	... ..	—	.17
Putrescibility	... ..	—	3/304
Free and saline ammonia	... ..	1.69	1.59
Albuminoid ammonia	... ..	.50	.095
Nitrite (in terms of $\text{NH}_3$ )	... ..	—	.01
Nitrate ( " " " )	... ..	—	.16
Chlorine	... ..	4.0	4.0
Dissolved oxygen absorption (*Royal Com- mission Test)	... ..	—	.45
Suspended Solids	... ..	7.6	.32
Volume of sewage treated (gallons per day)	... ..	357,000	
Air consumption :—			
Cub. ft. free air per gallon of sewage treated	... ..	1.08	
Average detention period :—			
Aeration tank capacity 60,000 gallons	... ..	4.0 hours	
Settlement tank capacity 27,000 gallons	... ..	1.8	"

\* Standard recommended, 1.40.

The average composition of the sludge (dry), as ascertained from fortnightly samples, was as follows :—

	Per cent.
Organic and volatile matter ... ..	69·1
Mineral matter ... ..	30·9
<hr/>	
Nitrogen (as N) ... ..	6·0
Phosphoric anhydride ( $P_2O_3$ ) ... ..	3·6

“ During the 190 days’ operation falling within the period September 11 and the year ending March 26, a total volume of 283,000,000 gallons of sewage has been successfully treated, at the average rate of 1,490,000 gallons per day, with an average air consumption of ·87 cub. ft. free air per gallon of sewage treated.

“ The average analytical returns, etc., for this period of 190 days are tabulated below :—

LARGE-SCALE UNIT : RESULTS IN GRAINS PER GALLON.

	Screened and Detritus-free Sewage.	Effluent.
Four hours’ oxygen absorption ... ..	2·25	·43
Three minutes’ oxygen absorption :—		
Before incubation ... ..	·78	·19
After incubation ... ..	—	·18
Putrescibility ... ..	—	1/158
Free and saline ammonia ... ..	1·38	1·34
Albuminoid ammonia ... ..	·48	·095
Nitrite (in terms of $NH_3$ ) ... ..	—	·01
Nitrate ( „ „ ) ... ..	—	·16
Dissolved oxygen absorption (*Royal Com- mission Test) ... ..	—	·59
Suspended Solids ... ..	7·8	·62
Volume of sewage treated (gallons per day) ... ..	1,490,000	
Air consumption :—		
Cub. ft. free air per gallon of sewage treated ... ..		0·87
Average detention period :—		
Aëration tank (capacity, 325,000 gallons) ... ..		5·2 hours
Settlement tank (capacity 88,000 gallons) ... ..		1·2 hours

\* Standard recommended, 1·40.

“ Running costs.—The power required for the operation of this unit is from 18 to 19 b.h.p. (measured at the switchboard) per million gallons of sewage treated.”

FLOOD (G. M.). **Efficiency in Refuse Disposal.**—*Jl. State Med.* 1924. Dec. Vol. 32. No. 12. pp. 585–587.

The argument here is that the collection and disposal of refuse—a matter of infinite importance in the prevention of flies—should be the care of the engineer rather than of the M.O.H. Particularly so when disposal is by the ideal method of incineration, the full efficiency of which can be secured only by one who understands the construction and working of incinerators—a matter entirely within the engineer’s province. Refuse is not the same everywhere. No small town should think of constructing an incinerator without knowing what weight of refuse has to be disposed of daily, and the nature of the refuse, par-

ticularly the estimated percentage of combustible matter and of water. The builder of the incinerator should guarantee both the efficiency and the economy of his design.\*

BALL (Geo.). [**Motor Transport for Removal of House Refuse.**]—*Surveyor & Municipal & County Engineer.* 1924. Apr. 18. Vol. 65. No. 1683. pp. 381–382. [Summarized in *Public Health Engineering Abstracts.* 1924. July 19. J-840.]

"Some 50 replies to a questionnaire regarding refuse collection methods, sent to towns of 13–60,000 population [in England], are summarized. Of the 30 towns still using horse-drawn vehicles, 5 have experimented with various types of mechanical tractors, 4 have combined systems, and 7 are considering other types of vehicles. Twenty towns have adopted self-propelled vehicles of various kinds. It is concluded from consideration of the replies that where refuse depot is situated within 1 mile radius of centre of collection it is more economical to employ horse haulage, and when distance is greater than 1 mile mechanical traction is more economical."

### SMALLPOX VACCINATION.

UNITED STATES PUBLIC HEALTH SERVICE. **Health News.** [Mimeographed Circulars. A-13.]

"Some Interesting Side Lights on a Recent Epidemic of Smallpox.—Through the courtesy of the State Health Officer of the State of Minnesota, Surgeon General CUMMING, of the Public Health Service, is able to furnish the following information with regard to an outbreak of malignant smallpox beginning in Minnesota in the early part of this year.

"The disease was introduced at Duluth in January, 1924. The first case was that of a male nurse, 54 years of age, who had never been successfully vaccinated, and who died within a few days. Subsequently there developed other cases, making a total of 182 for this epidemic. It is interesting to note that 139 of the persons who had smallpox had never been successfully vaccinated in their lives. Of these 139 persons who had never been successfully vaccinated, 34 died. Of the remaining 43 persons who had the disease, 39 had not been successfully vaccinated within seven years, and of these 39, 6 died. This leaves 4 cases still to be accounted for. Of these, 2 had been vaccinated in less than seven years, but did not die from the disease. Two others had had smallpox when they were children, and they recovered. Of those persons who died, although they had been once successfully vaccinated, we have the following histories: One woman, age 59, was vaccinated in childhood; one, aged 49, was vaccinated when 8 years old. One woman, 24 years of age, who was not in very good physical condition at the time she contracted the disease, had been vaccinated in childhood. One man, 37 years of age, had been vaccinated when he was three and a half years old. One man, 55 years of age, had been vaccinated when he was six months old. One man, who was 55 years of age, had been vaccinated when he was one year old.

---

\* Summarized by Lt.-Col. A. ALCOCK.

"From these data, which have been very carefully collected, it will be seen that smallpox still runs true to form in that it attacks persons who are either not protected by vaccination at all or who have lost the protection which they once had.

"Smallpox has never occurred to any appreciable extent in persons who have been recently, successfully vaccinated."

LEGENDRE (J.). **Les épingles pour la vaccination antivariolique en série.**—*Rev. Méd. et Hyg. Trop.* 1924. May-July. Vol. 16. No. 5. pp. 133-134.

The writer makes an ingenious suggestion for using ordinary pins as scarificators for vaccine. The pins being put into a dish with a little alcohol, which is lighted and allowed to burn out, are perfectly sterilized; one is used for each operation (and can be re-sterilized). Three lineal scarifications are made on the skin, the lymph being rubbed in, in the ordinary way.

## DISINFECTION.

UNITED STATES. **Treasury Department. Annual Report of the Surgeon General of the Public Health Service of the United States for the Fiscal Year 1923.** [CUMMING (H. S.). Surgeon-General.]—pp. vi-316. With 10 figs. 1923. Washington: Govt. Printing.

"*Investigations of the artificial and natural ventilation on steam ships and the use of cyanogen chloride as a new fumigant.*—The constituents used in the preparation of this gas are as follows:—

"4 ounces powdered sodium cyanide.

"3 ounces sodium chlorate.

"2 ounces talc.

"17 fluid ounces commercial hydrochloric acid, specific gravity 1.15 to 1.20.

"17 ounces water.

"Note.—This formula is tentative and may be changed later . . .

"During the first half of the fiscal year over 300 ships were fumigated with this gas, and it has been found to fulfil the following requirements:

"1. Toxicity: High toxicity for rodents, bats, roaches and bedbugs. (The amount required for lice requires further experimentation.)

"2. Detection properties: Intense lacrimation when lethal dose is used. In one-eighth lethal dose (having no harmful effect on rats after exposure of one hour) lacrimation was still extreme.

"3. No effect on foods, tobacco, fabrics, leather, and no corrosive action on metals (with the possible exception of nickel).

"4. Efficient penetration qualities.

"5. Nonpersistence: This gas is not more persistent than hydrocyanic acid gas; probably less so.

"6. Reasonably low cost per 1,000 cubic feet. Cyanogen chloride mixture, \$0.088; hydrocyanic acid gas, \$0.081.

"7. Fire and explosive hazards at minimum."

\* \* \* \* \*

*Quarantine recommendations.*—"The cyanogen-chloride mixture is somewhat tarnishing to brass, nickel, and silver, although by no means to the same degree as is sulphur dioxide. While apparently



satisfactory for the destruction of rodents in the standards provided, it does not appear to have the same destructive action on roaches and other insects as does hydrocyanic-acid gas.

"From time to time note has been made as to spontaneous combustion with production of fire within the containers. This appears to occur in compartments having high temperature and in those containers in which the gas is more rapidly evolved, producing greater concentration. In spite of these defects, in this method it is believed that cyanogen chloride is preferable to hydrocyanic-acid gas as a fumigant, because of the automatic warning provided through its lachrimatory properties.

"The ventilation of holds of vessels after fumigation (and this especially applies to vessels with several 'between' decks) still remains the most serious problem of the fumigation procedure. With a moderate wind blowing, ventilation by means of improved windsails is reasonably satisfactory, and the use of areo-thrust ventilators is fairly effective; but the latter device is difficult to transport and the engine is of such a design that even with the most careful attention it is frequently out of order. Some effective means of ventilating holds of vessels is the most urgent need in ship fumigation."

SCHAEFER (H. F.). **Accidents mortels au cours de la dératisation de navires par l'acide cyanhydrique.**—*Rev. d'Hygiène.* 1924. July. Vol. 46. No. 7. pp. 694-696.

A graphic account of the invasion by hydrocyanic gas of the engine room of a ship, the holds of which had been disinfected at Havana in the usual way, and the collapse of a number of the crew in turn, till 20 were affected. Most were restored by artificial respiration, but five succumbed. It is noted that the Americans have the ship cleared of crew before fumigation with this gas. This occurrence shows that beside the well-known abrupt fatal intoxication with hydrocyanic gas there is a mild non-fatal form, and that the assertions of naval engineers that bulkheads are watertight are not always reliable.

## CHILD WELFARE.

FEDERATED MALAY STATES. **Report on Infant Welfare and Maternity Work in Kuala Lumpur for the Year 1923.** [WERE (M. Josephine), Lady Medical Officer.]—6 pp. Supplement to the *F.M.S. Government Gazette*. August 8, 1924. Govt. Press.

"The centre is primarily an educational institution. It provides advice and teaching for young mothers of all nationalities in the care and management of their infants with a view to maintaining them in good health. The work of the Centre is directed rather to the supervision of the healthy infant and the education of the mother than to the treatment of the sick, but here the incidental treatment of simple ailments is included within its scope.

"Staff.—The staff of the Centre is as follows :—

"One lady Medical Officer; one Superintendent, European nursing sister; two health visitors."

Attendances.

			Infants.		Children.
1923	...	...	5,777	...	2,872

## MEDICAL INSPECTION OF SCHOOLS.

EKANAYAKA (H. E.). **Medical Inspection of Schools in Ceylon.**—*Jl. Ceylon Branch of the Brit. Med. Assoc.* 1924. Sept. Vol. 21. No. 2. pp. 84–85.

We here find particulars of the results of medical inspection of the more important "English" schools in Colombo, Kandy and Ceylon, and of a few typical vernacular schools for purposes of comparison. Defective vision, enlarged tonsils and adenoids, and dental caries, very common among the European children, are comparatively rare among the native children. Next to those diseases in frequency are said to come malnutrition, malaria, hookworm, and skin diseases (itch). In the vernacular schools "the standard of hygiene . . . is low," and "the conditions obtaining in the school itself are a constant violation of all sanitary requirements." [The fact that "a class lesson in hygiene is prescribed in the code from the fourth standard upwards" is something for those who insist on the abounding efficacy of "education" to ponder.]\*

## REPORTS AND VITAL STATISTICS.

ROCKEFELLER FOUNDATION. **International Health Board. Tenth Annual Report, January 1, 1923–December 31, 1923.** [RUSSELL (Frederick F.), General Director.]—pp. xvii+158. With 55 text figs. 1924. Jan. New York: Rockefeller Foundation, 61, Broadway.

The International Health Board's Annual Report is, as usual, an extremely fascinating document. It deals with the very wide activities of the Rockefeller Foundation, spread over the East, China, India, Ceylon, and many countries in Europe, and the United States of America. The accompanying plans and pictures speak for themselves. (Figs. 27–32.) A few extracts of a more scientific nature are given on the subject of hookworm and malaria.

*Hookworm.*—"Worm counts made in the district jail at Arecibo [Porto Rico] showed that agricultural labourers harboured an average of 572 worms, whereas town dwellers had only 210. For comparison, it may be stated that the agricultural labourer in Brazil has an average of 230 worms. In both countries it has been shown that occupation and habit as to shoe-wearing greatly influence the severity of the infestation, the farmer and those who habitually go barefooted showing always the highest rate."

*The Spleen Index in Malaria.*—"Relation between Degree of Splenic Enlargement and Malaria Infection.—In a series of 338 cases examined in Lee County a definite correlation was found to exist between the size of the spleen and the amount of malaria as measured by the plasmodia in the peripheral blood. Of 51 persons in whom the spleen was palpable on inspiration, 35.3 per cent. revealed plasmodia in the peripheral blood; of 126 with palpable spleen, 34.1 per cent. were positive for plasmodia; of 29 with spleen enlarged to one fingerbreadth below the costal margin, 55.1 per cent. were positive

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\* Summarized by Lt.-Col. A. ALCOCK.

for plasmodia; of 30 with spleen enlarged to two fingerbreadths below the costal margin, 60.0 per cent. were positive to plasmodia; and of 23 with spleen enlarged to three fingerbreadths below the costal margin, 69.5 per cent were positive for plasmodia.

"A comparison of the spleen rates, plasmodium rates, and malaria history index of 571 persons examined on 30 plantations in the county showed that the spleen index furnished a more sensitive measure of malaria than the blood index."



Fig. 27.—Map showing lack of trained personnel for spreading public health education in the Philippine Islands. The provincial or district nurse, of the type which the International Health Board is aiding the Philippine Health Service to train, spends most of her time in visiting the houses of the poorer classes, giving the necessary nursing care and teaching hygiene and sanitation.

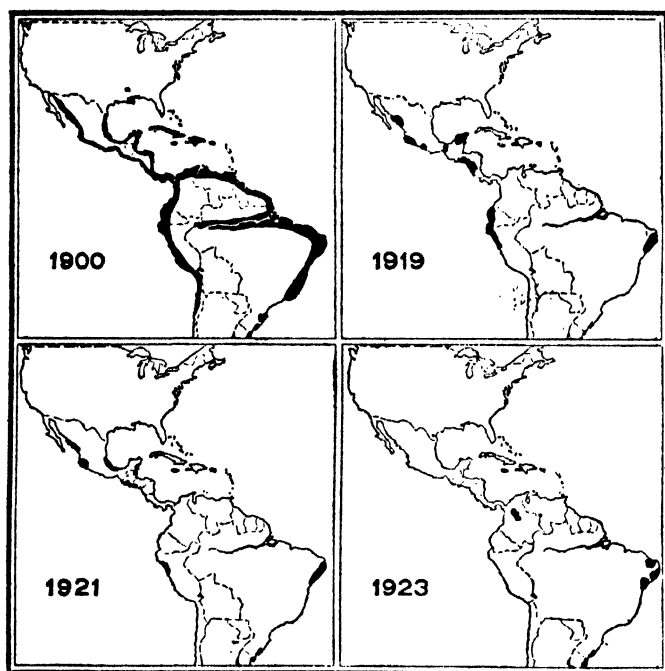


Fig. 28.—Yellow Fever in retreat. Map of western hemisphere showing steady reduction of infected areas.

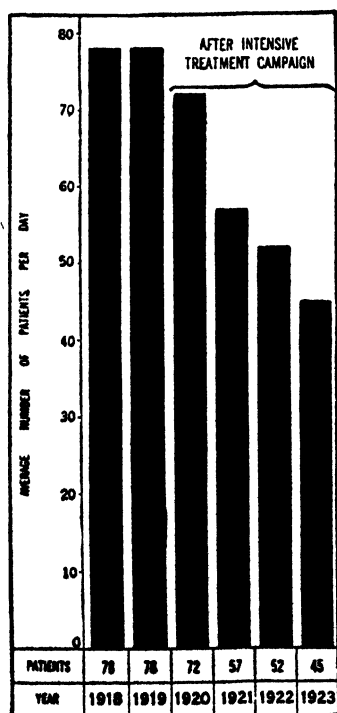


Fig. 29.—Reduction in the average daily number of patients treated in the Lionel Town Hospital, Jamaica. The figures show that the intensive hookworm campaign diminished the amount of sickness from all diseases, and especially from typhoid and dysentery.

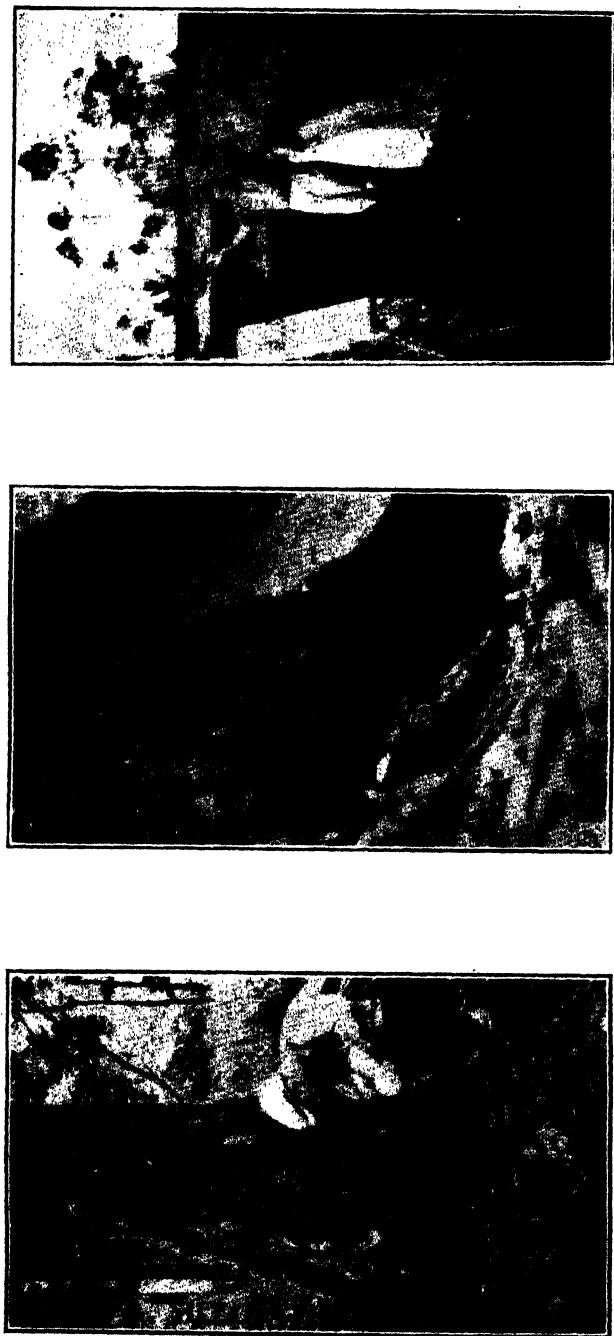


Fig. 30.—(a) A tree hole shelter for *Anopheles quadrimaculatus*; (b) a close-up view of same hole, showing numerous mosquitoes resting; (c) railway culvert: a favourite resting place of *A. crucians*, which breeds in the water in the foreground.



Fig. 31.—A “mojarrito” hatchery in Merida, Mexico.

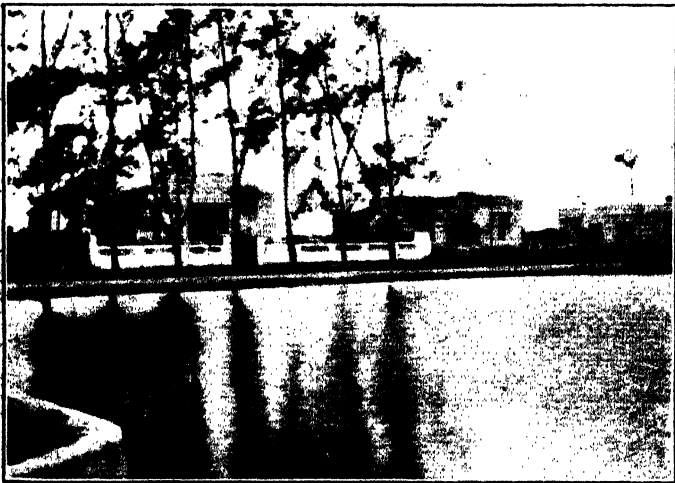


Fig. 32.—Artificial pond in public garden in Bahia, Brazil. Fish are being bred in this pond for use in combating the yellow fever mosquito.

[Figures 27 to 32 are reproduced from the *Tenth Annual Report, International Health Board, Rockefeller Foundation, Jan.-Dec., 1923.*]

PANAMA CANAL. **Report of the Health Department of the Panama Canal for the Calendar Year 1923.** [FISHER (H. C.), Chief Health Officer.]—95 pp. With 1 plate. 1924. Panama Canal Press, Mount Hope, C.Z.

The area with which this Report is concerned is the Canal Zone proper, with a population of 31,793, and the towns of Panama (59,000) and Colon (31,000).

In the Canal Zone the death rate was 7.14 and the birth rate 18.59. Ten per cent. of the deaths were caused by tuberculosis. The infant mortality was 72.76. In Panama City the death rate was 18.08, of which tuberculosis accounted for 18 per cent., an increase on the two previous years. The infant mortality was 141.95. The annual malarial rate per 1,000 (13.09) was higher than in the three previous years.

"Although the sanitated areas of the Zone are gradually being extended, principally by ditching of the larger outlying swamps and wet lands, there has been a slight increase in the malaria rates, especially among employees, yet the increase is not as large as might have been expected. On opening the Zone to re-population for agricultural purposes, chiefly by former employees of the Panama Canal, it was feared that, whatever benefits might be derived, there would surely result a tremendous infection with malaria, and that in spite of our precautions in locating these settlers at a distance of a mile or more from the Canal Zone towns, our employees would necessarily be infected from them. This has doubtless been the case in some instances, but the small added percentage of malaria so incurred has surely been more than offset by the improved economic condition of the population."

The "follow-up" treatment—10 grains of quinine preferably in liquid form every evening for 8 weeks after the subsidence of acute symptoms—is compulsory for employees, and relapse is rare.

The diagram (Fig. 33) shows the combined death rate from malaria in the Zone and the two cities.

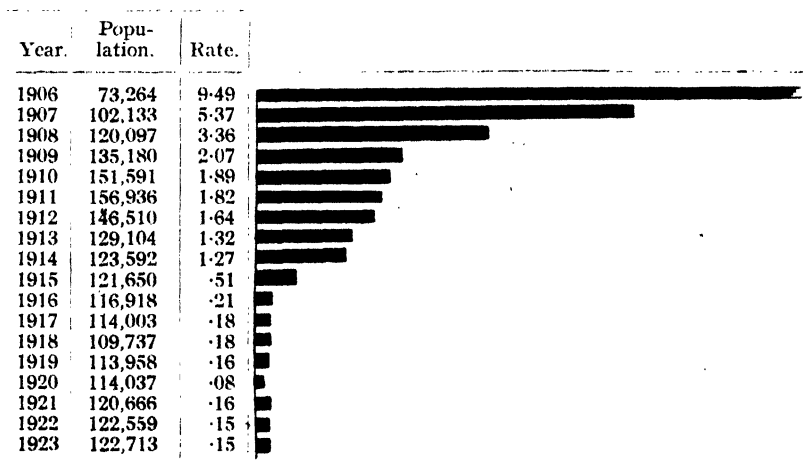


Fig. 33.—Diagram showing the combined death rate from malaria in the Canal Zone and the cities of Panama and Colon.

[Reproduced from the *Report of the Health Department of the Panama Canal for the Calendar Year 1923.*]

"An attempt is made to control all forms of mosquito breeding in the sanitated areas. Within a radius of approximately one mile from the residential sections, in addition to installing new drainage (subsoil or rock-covered tiling where practical), open ditches are kept to grade and free from vegetation, and oil is applied when indicated. Beyond the mile limit large areas of anopheles production are controlled by open ditching. These latter ditches receive sufficient attention to keep them efficient as drains, but no labour is expended upon the small amount of breeding that may occur in the ditches and isolated small puddles and cattle tracks."

Where conditions favoured only the production of *Anopheles eiseni*, oiling was abandoned and trees allowed to grow along the banks to produce dense shade; this species may be disregarded. The group known as *A. albimanus-tarsimaculata* may be considered the one important carrier, and the other seven or eight species of relatively less importance.

In his Report from the Health Office, Panama City, Dr. GOLDTHWAITE notes that, owing to the increase of diphtheria, throat cultures were taken from all school children. A total of 11,114 cultures gave virulent *B. diphtheriae* in 37 cases. He shows that the tuberculosis death rate has varied little in ten years, and expects no change till a sanatorium is constructed in a suitable place. In this year all dairy herds were given tuberculin tests; 40 reactors were found. In the native abattoir four animals were found with tuberculous lesions: it is commonly said that none of the native cattle are tuberculous.

Surgeon RUCKER, Chief Quarantine Officer, visited many Central and South American ports during the year.

"His reports indicate that yellow fever has almost ceased to be a quarantine problem. As a matter of fact, sanitary conditions in the Canal Zone are such that there is no practical danger of the spread of yellow fever even though it should be introduced. This belief is so strong that when yellow fever was discovered at Bucaramanga, in the interior of Colombia, the only restrictions placed on travellers from Atlantic coast ports of that country were that their temperatures should be taken daily by the ship's surgeons and a record thereof be furnished the quarantine boarding officer, and that the passengers report to the latter daily to complete six days from port of departure in order to have their temperatures taken."

Bubonic plague on the west coast of South America is a very genuine menace.

"In November, 1922, the quarantine division adopted tentatively the use of cyanogen chloride as a ship fumigant . . .

"Another formula was finally used which omitted the talc entirely and reduced the quantity of sodium chlorate thirty-three and a third per cent. The cyanide eggs are cracked into fairly good-sized lumps, and when prepared in this way the gas does not come off rapidly enough to constitute a fire hazard, although the process is not unduly slow. By hanging the generators just inside the hatches it was found that considerable time is saved and good diffusion of gas obtained. So satisfactory have been the results achieved by following this method that cyanogen chloride has been made the standard fumigant of the Panama Canal. It is a most rapid, satisfactory fumigant, and when demurrage losses are considered it is the cheapest method, costing less than half as much as sulphur dioxide and about 15 per cent. less than hydrocyanic acid."



Owing to the appearance of the article, "Plague Infected Rats without Visible Lesions," the animal inoculation method was used in the examination of a portion of the rats submitted to the laboratory, and 520 rats have been thus examined without discovery of plague. Over 14,000 were examined in the usual way.

14,648 Wassermanns were done on 9,680 persons. The table gives the results:—

	Positive.	Negative.	Total.	Per cent. positive.
White civilians and soldiers	592	4,469	5,061	11.69
Spanish and white natives	96	558	654	14.68
Blacks and mulattoes ...	925	2,980	3,905	23.68
Chinese ... ..	19	41	60	31.66
Grand totals ... ..	1,632	8,048	9,680	16.85

Of 205 cases which came to autopsy the chief causes of death in descending order were tuberculosis, syphilis (including general paresis), malnutrition in infants, organic heart disease, cancer.

BRITISH HONDURAS. **Medical Report for the Year 1923.** [WILSON (Basil M.), P.M.O.]—22 pp. 1924. Belize: Printed by V. Goodrich.

"*Enteric Fever.*—The Colony is remarkably free from this group of diseases. Only one case was treated in Belize Hospital, and none in the district hospitals. It is possible that unknown cases occur in the remote settlements.

"*Malaria.*—112 cases of all types were treated in Belize Hospital without any deaths; 134 cases were treated in district hospitals with 4 deaths. The Registrar-General's returns of deaths for the whole Colony show 32 deaths certified by registered medical practitioners from malaria; of these 10 are in the Belize district. On referring to the causes of deaths in cases not certified by registered medical practitioners there is naturally considerable doubt as to the diagnosis, but it is probable that about 150 cases were due to malaria. As to the actual prevalence of malaria I have no statistics, but I have no hesitation in saying that it is extremely common and is the cause of a great majority of absences from work and invalidity.

"*Dysentery.*—16 cases of amoebic dysentery and 3 cases of bacillary dysentery were treated in Belize Hospital, with one death; 39 cases of both types were treated in district hospitals, with one death.

"*Pulmonary Tuberculosis.*—31 cases with 16 deaths were treated in Belize Hospital; 22 cases with 5 deaths were treated in district hospitals."

*Vital Statistics.*—1923. Population, 46,527; total births, 1,764; total deaths, 954; birth rate, 37.9; death rate, 20.5; infantile mortality, 133.

*Sanitation. Preventive Measures.*—"The anti-mosquito work is by far the most satisfactory part of all the sanitary work which is done in the Colony. It is, however, not carried out on a sufficiently large scale. In Belize each inspector has one section of the town. Eight days in each month are allotted exclusively to mosquito work, and during that time every vat, well, barrel and other water receptacle, including flower vases in the houses, is examined and the presence or absence of larvae is recorded on special forms . . .

" Filariasis is, I believe, unknown in the Colony.

" Plague has never occurred. It is very improbable that it would be brought here by sea, as all steamers have to anchor at least a mile from the shore. There are no wharves for large vessels . . .

" Dysentery : It will be seen from the hospital returns that amoebic dysentery is not very common and bacillary dysentery is comparatively infrequent.

" House flies are not nearly so common here as in many tropical countries, in spite of the fact that the general standard of sanitation is not high."

TRINIDAD & TOBAGO. **Council Paper No. 58 of 1924. Health Conditions, 1923. Administration Report of the Medical Inspector of Health for the Year 1923.** [DICKSON (J. R.), Medical Inspector of Health.]—14 pp. 1924. Port of Spain : Govt. Printing Office, 2, Victoria Avenue. [Price 6d.]

Vital statistics :—

" Population estimated to mid-year ... ..	374,927
" Area of Trinidad (1,862 sq. miles), Tobago (114.40 sq. miles) ... ..	1,976.40 sq. miles
" Density of population ... ..	189 per sq. mile
" Total number of births registered ... ..	13,060
" Birth rate per 1,000 of the population ... ..	34.8
" Total number of deaths registered ... ..	7,862
" Death rate per 1,000 of the population ... ..	20.9
" Natural increase, i.e., excess of births over deaths ... ..	5,198
" Total number of still births registered ... ..	1,021
" Number of deaths of children under 1 year ... ..	1,695
" Infantile mortality rate (per 1,000 births)... ..	129.7
" Notifiable infectious diseases—total death rate per 1,000 of population ... ..	2.46
" Malaria death rate per 1,000 of population... ..	2.01
" Diarrhoea and enteritis do. do. ... ..	1.39
" Dysentery do. do. ... ..	.52
" Enteric fever do. do. ... ..	.38
" Bronchitis and broncho-pneumonia do. ... ..	1.57
" Pulmonary tuberculosis do. do. ... ..	1.25
" Pneumonia do. do. ... ..	.82
" Nephritis and Bright's disease do. ... ..	1.37
" Cardiac diseases do. do. ... ..	1.05
" Ankylostomiasis do. do. ... ..	.66
" Cancer do. do. ... ..	.39

KENYA. **Colony and Protectorate of : Annual Medical Report for the Year ending 31st December, 1922** [GILKS (John L.), P.M.D.], including the **Annual Report of the Bacteriological Laboratory for the Year 1922.** [KAUNTZE (W. H.), Senior Bacteriologist.]—201 pp. With 2 charts. Printed by Waterlow & Sons, Ltd., London.

There is much interesting matter in this Report, particularly under the head of Yaws and Plague.

*Rats and rat fleas.*—"Identification of fleas from 1,146 rats (*Rattus rattus kijabius*) caught in Nairobi between December 7th, 1921, and December 6th, 1922:—

" Number of rats examined	...	...	1,146
" Number of rats without fleas	...	...	441
" Total number of fleas	...	...	3,105
" Average number of fleas per rat	...	...	2.7

\* \* \* \* \*

" *Effects of the rat campaign in the incidence of plague.*—In last year's report it was stated that 'in the absence of detailed records of past outbreaks of plague in these districts, and particularly in the absence of information with regard to their seasonal incidence, it is not yet possible to draw any conclusions as to the results of the campaign, and it is unlikely that it will be possible to do so until it has been in operation for some years.' That statement still holds good, and though one might be tempted to correlate the small incidence of plague in 1922 as compared with the very considerable incidence in 1921 with the amount of rat-destruction which has been carried out, there is not, as yet, any justification for so doing. That such outbreaks as occurred were comparatively few in number and that none of them assumed any considerable proportions may, of course, have been due to the campaign. Of that, however, there is as yet no proof. The important point which emerges is that, in spite of the campaign, certain small outbreaks of human plague did occur, i.e., it has been proved that, in spite of the amount of rat-destruction which took place, the infection still persists either in the domestic rodents or elsewhere."

\* \* \* \* \*

*Helminthiasis.*—" . . . From 60 to 80 per cent. of the persons constituting these populations were found to be infected with one or more kinds of helminth. The proportion infected with ancylostomes was greater on the coast than in the highlands or in the lake area, and except for those so infected few persons appeared to show obvious symptoms of disease, and even those who harboured ancylostomes were only in a few cases seriously ill."

\* \* \* \* \*

*Preparation for the treatment of Yaws.*—"The success which the bismutho-tartarate of soda and potash has met with in the treatment of Yaws, combined with its low cost compared with the arsenobenzene compounds (I understand from the Principal Medical Officer that it will effect a saving in Kenya of something like £5,000 per annum), will probably bring to other colonial chemists the task of preparing this compound." The method of preparation was given in this *Bulletin*, Vol. 21, pp. 795-6.

SOUTH WEST AFRICA. [Union of South Africa: Mandated Territory.]  
**Report of the Administrator of South West Africa for the Year 1923.** [HOFMEYR (Gys. R.), Administrator.]—64 pp. 1924.  
 Cape Town: Cape Times, Govt. Printers.

In the administration report of South West Africa is an interesting chapter on the health conditions. One of the main features is a very great prevalence of enteric both amongst Europeans and natives. This is largely due to polluted water during heavy rain and to deficient

sanitary arrangements brought about by the primitive habits of the natives. The following brief extracts are of interest :—

"*Scurvy*.—210 cases with 13 deaths were recorded during the year. Of these 138 cases with 10 deaths occurred on the Luderitz Diamond Fields, and 34 cases with one death at Tsumeb. Measures for the prevention of the disease are undertaken by all the mining companies, and consist mainly in the provision of a liberal allowance of fresh meat and fresh vegetables in the dietary. Trials were also made with germinated pulses, but have not met with success up to the present owing to the natives refusing to take food prepared in this manner. Kaffir beer is issued at regular intervals. On some of the mines goats are kept for the supply of fresh milk for those showing any signs of the disease . . .

"Scurvy may be regarded as practically non-existent among the natives employed by the Railway Administration. Since the 1st March, 1923, only 18 cases have been met with among a staff of 2,875."

\* \* \* \* \*

"The number of cases of respiratory disease which came under notice during the year under review is as follows :—

	No. of cases.	No. of deaths.
Bronchitis ... ..	406	2
Acute Lobar Pneumonia ...	213	62
Influenzal Pneumonia ...	237	30
Pulmonary Tuberculosis ...	102	57
Other respiratory conditions	9	—

"Of the above, 387 cases of bronchitis, 120 of acute lobar pneumonia with 23 deaths, 223 of influenzal pneumonia with 30 deaths, and 57 of pulmonary tuberculosis with 29 deaths occurred on the Luderitz Diamond Mines. The incidence of all respiratory diseases among the natives employed on these mines was 138·5, and the mortality 15 per thousand for the year. At Tsumeb the mortality from the same causes among the native labourers on the Copper Mine was 1·24 per 1,000 for the year."

\* \* \* \* \*

"*Vital statistics*.—A law for the compulsory registration of births and deaths came into operation only on the 1st January, 1924. The information available for the year 1923 is incomplete and of little practical value. 389 births and 104 deaths were registered during the year.

ESPINASSE. **Le Service de santé en Mauritanie pendant l'année 1923.**—*Ann. de Méd. et de Pharm. Colon.* 1924. May–June–July–Aug. Vol. 22. No. 2. pp. 215–224.

Mauritania is a region of 347,000 square miles with a scattered population of 261,000. The medical personnel consists of a P.M.O. stationed at S. Louis and in charge of Senegalese troops there, three doctors in Mauritania itself, and 17 "infirmiers"; it is obviously, as is stated, quite inadequate. Five districts are served by "infirmiers." The diseases treated in the year under review included :—

Syphilis ... ..	2,271	Smallpox ... ..	72
Malaria ... ..	1,442	Mumps ... ..	35
Gonorrhoea ... ..	125	Scurvy ... ..	20
Guineaworm ... ..	84	Trachoma ... ..	19
Beriberi ... ..	79	Tuberculosis ... ..	6

Europeans do well and are rarely invalided. Syphilis in many stations is the occasion of more than half the consultations; primary lesions are seldom seen; nervous symptoms are rare; the most common manifestations are those of the skin.

**MAURITIUS. Annual Report on the Medical and Health Department (1st January to 31st December 1923).** [GILCHRIST (T. B.), Director, Med. & Health Dept.]—41 pp. With 2 charts.

Estimated population	...	...	381,678
Birth rate	...	...	36·8 per cent.
Death rate	...	...	28·5 per cent.

"The number of deaths due to malaria and cachexia (highest death-producing factors in Mauritius) is 1,979, against 3,526 in 1922, or a percentage of 18·3 per cent. on total deaths, against 27·2 in 1922."

	1921.	1922.	1923.
Deaths from malaria in Port Louis	...	333	371
			169

"The more notable causes of deaths were the following:—

	Number.	Percentage to total deaths.
Malarial and malarial cachexia	...	1,979
Pneumonia and broncho-pneumonia	...	1,393
Influenza	...	556
Diseases of early infancy	...	1,026
Pulmonary tuberculosis	...	828
Diarrhoea and enteritis	...	625
Bronchitis	...	521
Dysentery	...	318
Plague	...	118
		18·3
		12·9
		5·2
		9·5
		7·7
		5·8
		4·8
		3·0
		1·1

"Deaths due to preventable diseases, *i.e.*, diseases due to faulty sanitary conditions, overcrowding, soil infection, defective or infective water supplies numbered 4,227."

Infantile mortality was 139·4 per mille, as against 147·9 and 179·7 in 1922 and 1921 respectively.

*Plague.*—"Rat-catching was persevered with throughout the year, and every rat caught, killed or found dead was examined bacteriologically.

"During the year all grain stores were regularly and often fumigated by means of the Clayton apparatus.

"Failure to eradicate plague and incomplete success of the anti-rat campaign are attributable to:—

"1. Old dilapidated buildings, out of repair, mostly old wooden buildings with double walls and connected with cellars and old drains.

"2. Overcrowding and insanitary mode of living of general mass of population.

"3. Lack of provision amongst the poor for keeping food out from access by rats.

"4. Grain stores, none of which is rat proof. Every Chinaman's house is a grain store. Rice, grain and gunny bags are stored all over the town.

"5. Ignorance of the population and reluctance to report cases of plague, specially in country districts, where straw huts are burnt when infected, although compensation is paid in each case."

" *Milk in Mauritius.*— . . . The whole question is being studied with the idea of improving the milk supply. There is no reason why milk should not be supplied clean and sweet in Mauritius. The questions of : (1) A Central Distribution Centre; (2) the difference between milk delivered to the consumer in the raw state and milk treated with heat for the destruction of bacteria before delivery, are receiving attention."

CENTRAL PROVINCES & BERAR. **Annual Public Health Report for the Year 1923.** [STOKES (T. G. N.), Director of Public Health.]—pp. 3+87. With 1 chart. 1924. Nagpur: Supt., Govt. Printing, C.P. [Price 1 rupee.]

" Population.—The total population of the province according to the census of 1921 is 13,912,760 . . . .

" Births.—The births numbered 634,862, or 45·63 per 1,000 of the population, against 35·80 in the previous year, and the quinquennial figure 38·08 . . .

" Deaths.—The number of deaths registered during the year was 424,789, giving a ratio of 30·53 per mille, as against 407,827 with a ratio of 29·31 in the preceding year, and 51·85 the average for the previous five years."

*Anti-malarial measures.*—" A new material to prevent mosquito breeding in pools of water was tried, viz., ' Empranin No. 2,' a mosquito larvicide, supplied by Messrs. Martin and Co., Calcutta. This was tried at Nagpur with excellent results, and it was found to be more efficient than kerosene, the film being good and the cost cheaper than common oil. It has been brought to the notice of the chief municipalities in the province."

*Medical Inspection of Schools.*—" These inspections are producing good results, since very few unvaccinated children or cases of contagious diseases are now seen in schools. Sanitary defects in schools, such as overcrowding, want of proper ventilation, urinal or latrine arrangements, etc., are also detected by the medical officers, and are reported to the school authorities for adequate action. The number of children examined by the medical officers during the year was 46,196 boys and 5,260 girls; of these 380 were found unvaccinated, 850 with enlarged spleen, and 617 with contagious diseases.

" In rural areas the epidemic dispensary staff inspected 967 schools and examined 49,759 children. Of these, 1,279 were found unvaccinated, 2,353 with enlarged spleen, and 1,526 with contagious and other diseases."

BANGALORE. **Health Department, Civil and Military Station. Administration Report for 1922-1923.** [AMRITARAJ (S.), Health Officer.]—pp. 44+ix.

Birth rate, 40·59 per mille, shows an increase of 2·6.

Death rate, 39·99 per mille. Average of the previous 5 years being 32·7.

Higher death rate is mostly due to plague.

Infant mortality, 266·5 per 1,000 children born.

There was a violent outbreak of plague during the year which was combated largely by extensive inoculation.

Fever mortality [total deaths]:—

Malarial fever	...	...	...	...	82
Influenza	...	...	...	...	51
Enteric group	...	...	...	...	17
Relapsing fever	...	...	...	...	13
Fevers of uncertain origin	...	...	...	...	294

**SARAWAK. Annual Report of the Sarawak Government Medical Department for the Year 1923.** [MARJORIBANKS (E. M.), P.M.O.]—25 pp. 1924. Kuching: Govt. Printing Office.

General Hospital.

"*Phthisis*.—There is little that can be done for the type of cases that come under our observation. They seldom present themselves for treatment until either alarming hæmoptyses or advanced emaciation and weakness force them to seek alleviation. Again, the bulk of them have been opium smokers, and some still are. They are given a special dietary, and open air treatment is carried out on the usual lines. A few cases have shown marked improvement with sodium morrhuate and tuberculin injections. The disease is rampant in the city, the bazaars being chiefly responsible for its incidence and spread. Overcrowding is common in many houses, and the principles of ventilation and general sanitation are entirely disregarded. It is therefore not surprising that the disease is gaining ground.

"*Beri-beri*.—Admissions occur on an average of 2.5 per month. The results of treatment on dietetic lines have been most favourable. As often as possible samples of rice are called for from the patients' houses or from the estate or factory in which they are employed. The specimens were practically always highly over-milled. A consistent standardisation of the supply purveyed by the rice merchants would be of valuable assistance.

"*Malaria*.—The number of cases of malaria was comparatively small. The majority came from Satang Island; a few developed cerebral symptoms. Treatment was administered by the intramuscular and intravenous methods. Two fatalities occurred soon after admission; they were in an extreme toxic condition. The remarkable diminution in the size of the enlarged spleens after injections of Novarsenobillon was worthy of note."

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*Pathological Department.* [Le SUEUR (Elizabeth), Pathologist.]—

	Fæces Examina- tions.	Hook- worm.	Round- worm.	<i>Entamoeba</i> <i>Histoly-</i> <i>tica</i> .
		per cent.	per cent.	cases.
Routine laboratory work...	2,160	46	52	45
Sarawak Rangers and families ...	271	40	70	—
Sarawak Police ...	144	24½	47	—
Convent girls and hospital	98	38	88	—
Sadong miners: ...	508	—	—	—
Surface workers ...	—	100	70½	—
Underground workers ...	—	97	26½	—
Brooketon Mines ...	50	100	80	—

\* \* \* \* \*

"One may make preliminary remarks on the presence of filarial infection in this country. The matter has never been scientifically worked out. In the laboratory we have examined 1,416 slides of night and day blood of Chinese, Malays, Dyaks and Tamils.

"Results show an infection of Chinese and Tamils only in night blood—about 3 per cent.

"In Malays and Dyaks a non-periodic micro-filaria is present, 12 per cent. day and 10 per cent. night blood.

"The Dyaks of Simanggang seem to be the most heavily infected people.

"Further work on this subject would be of great interest to the medical world, but one can draw no conclusion until one has examined a large number of slides and worked out the infecting mosquito in all types of filaria.

"I was at Sadong from January 16th to February 10th, and investigated the incidence of Hookworm and other intestinal parasites there. I found the mine population heavily infected with both hook and round worms. I visited Sadong in May and arranged for treatment and for prophylactic control against reinfection. The mine population are localised in the district around the mine and are directly under control of the manager—(making treatment and control of the disease practical). Mass treatment with carbon tetrachloride and oil of chenopodium was given, patients being admitted for 12 hours to the mine hospital. The drug proved quite efficient and safe. Mr. Evans reports later in the year that the results of treatment have been apparent in the immediate and sustained reduction in the hospital attendance by about 60 per cent., and in the better working capacity of the men. The success of the treatment is largely due to his interest in the scheme and his energy in supervising the provision of sanitary accommodation and prophylaxis."

STRAUB (M.). **Over zuigelingensterfte op de ondernemingen in Deli, S.O.K.** [Infant Mortality on the Estates in Deli, E.C. Sumatra.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1924. Vol. 64. No. 6. pp. 978-988. With 3 text figs. [3 refs.]

This article concerns the children of Javanese coolies on rubber and tobacco estates. The infant mortality under one year of age was found to vary from 16 to 31 per cent. The highest mortality occurs in the first four months of life ( $3\frac{1}{2}$  times the mortality of the same age class at Amsterdam in 1913). Diseases of the respiratory tract constitute the principal cause of death (25 out of 39 deaths, 14 out of 30 deaths); ignorance of the mothers, resulting in ill-treatment of the babies, appears to play an important part in this respect. Nearly all the mothers suckle the children, but additional rice feeding is common after a few weeks. Yet the majority of the children thrive and intestinal affections are of little importance. Syphilis is of no practical importance as a cause of death; hereditary syphilis is rare. Malaria may be the cause of high mortality wherever it occurs in epidemic form.

Here and there attempts are being made to improve the situation. The mothers should be encouraged to bring sick children to the hospital; regular and frequent control and weighing of the children



on the estates is necessary; crèche rooms, where the children are attended to during the working hours of the mothers, may do away with the habit of carrying the babies about during the work.\*

MITCHELL (J. A.) **The Avoidable Wastage of Child Life in South Africa.**—*Med. Jl. S. Africa.* 1924. Sept. Vol. 20. No. 2. pp. 34–37. With 1 chart.

An address delivered at the Child Welfare Conference, Capetown, March, 1924. The author gives an interesting chart of the infantile mortality of European infants from the year 1910 to 1922. (Fig. 34.) It shows a steady fall for all the Provinces of South Africa in the last 12 years and lower figures throughout for Natal. The present rate for the whole Union is about 80; the author believes it could be reduced in a few years to below 60. He would have a National Council to co-ordinate and direct maternal and child welfare activities, the constitution of which should be chiefly voluntary, to be subsidized from Government funds.

FIGI. **Legislative Council. Council Paper No. 17. Medical Department. (Annual Medical Report for the Year ending 31st December, 1923.)** [MONTAGUE (A.), Chief Medical Officer.]—38 pp. 1924. Suva: By Authority: S. Bach, Govt. Printer.

#### *Infectious Diseases.*

*Dysentery.*—The year 1923 was a satisfactory one as regards dysentery. In the Colonial Hospital and in Levuka Hospital there were fewer cases than in any previous year . . .

“*Enteric.*—Small epidemics of enteric fever occurred during the year . . . These small epidemics are generally due to the infection of water supply and the sporadic cases to fly-borne infection . . .”

“*Ankylostomiasis.*—The campaign against this disease was continued throughout the year under the guidance of Dr. Lambert of the Rockefeller Foundation. The drug used was carbon tetrachloride given with magnesium sulphate, and, where ascarides were prevalent, with oil of *Chenopodium* also. In all, 41,900 patients were treated, making a total with those treated in 1922 of 91,900 out of a total population of nearly 164,000 . . .

“*Influenza.*— . . . 1,008 cases were treated in the hospitals with 2 deaths . . .”

“*Other infectious diseases.*—Mumps and chicken pox were the other infectious diseases prevalent during the year. Chicken pox is always present in the Colony. Small localised epidemics occur, but there has never been a general epidemic. Mumps is introduced from outside the Colony from time to time.”

#### *Vital Statistics.*

Birth rate, 1922, for all races was 31·86 per thousand.

Death rate    “                    “    15·93    “                    “

\* Summarized by Dr. W. J. BAIS.

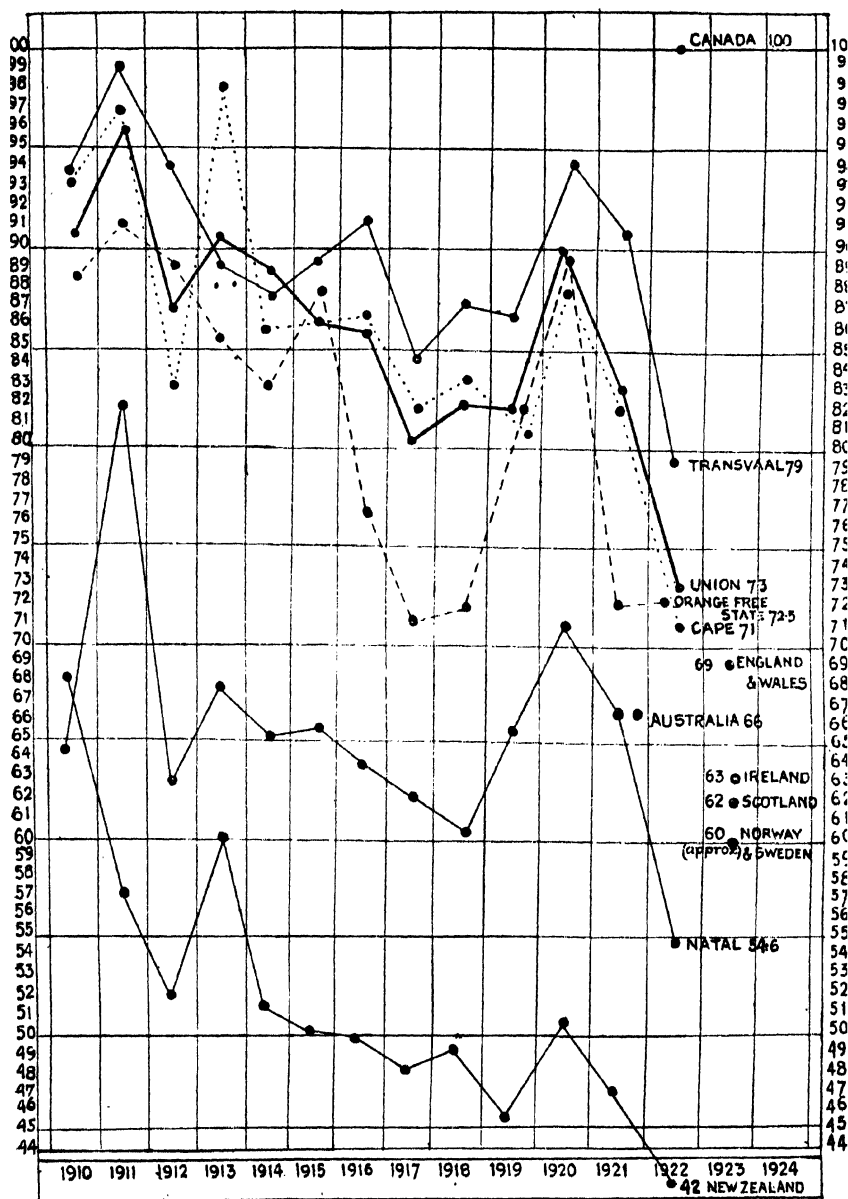


Fig. 34.—European infantile mortality in South Africa, *i.e.*, deaths of European infants under one year per 1,000 births.

[After figure in Dr. J. A. MITCHELL's paper in the *Medical Journal of South Africa.*]

**GIBRALTAR. Colonial Hospital. Annual Medical Report for the Year 1923.** [LOCHHEAD (Jas.), Surgeon, Colonial Hospital.]—4 pp. 1924. Gibraltar: Printed and published by William Miles, for the Garrison Library, Govt. Printers.

"During 1923 the outstanding feature has been the occurrence of an epidemic of scarlet fever in Gibraltar. It is the first recorded epidemic, and not even the oldest inhabitants can recall a similar outbreak. In previous reports I have referred to the absence of this disease amongst the Gibraltarians, even in years when the children of British soldiers here stationed were affected by it. An occasional doubtful case has from time to time been kept under observation in the hospital, but from 1912 till 1922, when two typical cases occurred, I had not seen a single undoubted case among the local population. The outbreak began in February, and it continued throughout the year, 218 cases in all being reported, of which 5 proved fatal. The first case to be admitted to hospital was received on April 11th, and, in all 29 cases were treated, with three deaths. Of the total, 13 were treated for the military authorities. The percentage of admissions was small, but no patient desiring to come into the hospital was refused. At the same time no pressure could be brought to bear on parents to send in affected children, because the accommodation is too limited for such an extensive outbreak. Should another epidemic of scarlet fever occur, and isolation in hospital be considered advisable, accommodation elsewhere must be found."

#### MISCELLANEOUS.

**VAN OYE (Paul). Les marais de la Province de l'Equateur au point de vue Hygiénique.**—*Bull. Agric. du Congo Belge*. 1923. Dec. Vol. 14. No. 4. pp. 535-544.

In the Equatorial Province of Belgian Congo there exist vast swampy forests periodically flooded in the rainy season, and having much the appearance (though, of course, the actual flora is quite different) of mangrove swamp. Their surface soil consists of a soft sticky mud, known as *poto-poto*, not much more than knee deep, lying upon a very firm and hard sandy subsoil. Leaves rot very slowly in the *poto-poto*, and its microflora and microfauna are particularly rich in bacteria, diatoms, confervoids, rhizopods, and flagellates; whereas in the firm subsoil micro-organisms of any kind are extremely scarce. In the rainy season the pools in the *poto-poto* are full of mosquito larvae. What the author would like to do is to clear the jungle, concentrate the water in fish-ponds by proper drainage, and bring the drained land, with its potential richness, under suitable cultivation. The fishponds, of course, would be stocked with good edible fish kept under proper piscicultural regulations.

The author believes stoutly that even such places as these equatorial marshes can be made safe for the white man. [And, really, when one considers what man has accomplished since he started on his long journey with nothing but a chipped flint, and perhaps a dog of some sort, who shall decry the author's faith?]\*

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\* Summarized by Lt.-Col. A. ALCOCK.

WEBSTER (J. S.). **Hospital Construction.**—*Far Eastern Assoc. Trop. Med. Trans. Fifth Biennial Congress Singapore. 1923. pp. 845-863.*

The writer gives a detailed account of the design of a thoroughly satisfactory hospital for tropical countries. All interested should obtain the paper.

As regards site selected we need not make any remarks. The area per patient is suggested as follows :—

1st and 2nd class wards.—	Single rooms,	200 sq. ft. and 2,800 c. ft.	
	General ward,	120 "	1,680 "
	Double room,	165 "	2,310 "
3rd class wards.—	Single room,	160 "	2,240 "
	General ward,	10 [? 100]	1,120 "

As regards the building the writer suggests that numerous blocks are more satisfactory than one large building, and advocates particularly the system, undoubtedly necessary for tropical countries, of a second and sometimes a third class division.

In the administrative block "the male reception rooms and the offices can be sited in one pavilion on the ground floor ; the rest of this pavilion may house :—

" 1. A students' common room.

" 2. A room for the casualty clerks on night duty, and which should therefore be next to the recovery ward.

" 3. A room for the staff containing a small reference library.

" The female reception room should be sited in the other pavilion of this block, which may also be used to house :—

" 1. The dispensary and drug store ; this unit must not be cramped for space, and must be well equipped.

" 2. A pack store in which the heavy baggage of the patients may be stored. This is essential in any seaport town, as it often happens that cases are landed from the ships and arrive at the hospital complete with baggage ; this baggage is both bulky and heavy, so for convenience in handling the store must be on the ground floor.

" 3. Store rooms.—The whole block is surrounded by a verandah 10 feet wide, which serves to connect the various rooms, and is expanded at the end to serve either as a waiting room for the office, or, where it is adjacent to the stores, as a platform for the dealing with the goods."

The store rooms should be at least 30 by 16 ft., and should be provided with stands and centre shelves. The laboratory should be 23 by 10 ft., and well lighted. The first class wards should be surrounded by a verandah some 10 ft. in width. A single room should be 16 ft. by 12-ft. 6 in., with a height of 14 ft. ; each room should have one door opening on to the verandah and one on to the passage. The general ward is 64 ft. by 30 ft. by 14 ft., so that each patient has 120 sq. ft. of floor space and 1,680 c. ft. of air space.

The ward offices are as follows :—

" 1. A sister's duty room fitted with two recesses, one for a wash hand basin, and the other as a medicine cupboard complete with door and lock.

" 2. A linen store fitted with shelves.

" 3. A surgical store where bed tables, splints, etc., may be kept. The upper part of this store is also fitted with a series of lockers, numbered to correspond with the beds and fitted with locks ; here the clothes in which the patient actually arrives may be kept after any requisite disinfection has been done.

" 4. A small medical store fitted for the examination of specimens.

" 5. A kitchen fitted to deal with the food arriving in the food wagons and also for the preparation of any simple diet; the floor and walls must be tiled. Next to it should be :—

" 6. The pantry with sink, draining boards and plate racks.

" 7. A dining room for convalescents; it should be opposite to the kitchen and on the other side of the passage; in this position easy, good and rapid attendance, with the minimum of labour to the staff, can be provided; the interposed passage cuts off any smell involved in the preparation of the food."

All corners and angles in this building should be rounded, all lighting preferably electric, electric fans should be provided when possible. The laboratory block, operation block, eye department and X-ray departments are described.

The third class accommodation is described as follows :—

" 1. In the admission blocks a section wherein the patients may be bathed must be provided. It will consist of three rooms, *i.e.*, a room where the case undresses, a bathroom, and a room where he dons the hospital clothes. A dirty clothes store or bin is needed, and a packstore in which his clothes are kept after disinfection and prior to his discharge.

" 2. An admission ward in which all the cases remain until diagnosed is essential.

" 3. The wards may be slightly smaller and accommodate twenty patients. No louvered casements for use during the storms are provided, as the doors will suffice, and free ventilation is obtained.

" 4. One ward designed for the dysentery cases to be fly-proofed.

" 5. One ward designed for the malaria cases to be mosquito-proofed.

" 6. The theatres to be simpler, as there will be no special departments, and the more serious operations will be performed in the large operating suite.

" 7. The floors to be of cement.

" 8. The latrines will be similar to those already described, but will have squatting seats.

" 9. Separate kitchens will be provided for Malays, Chinese, Sikhs and Bengalis.

" 10. No stores, as those already described will suffice."

The isolation block, nurses' home, dressers' quarters, etc., are also described.

ORTT (M. W. A.). **La surveillance des enfants des Indes néerlandaises qui séjournent dans les Pays-Bas.**—*Bull. Internat. de la Protection de l'Enfance*. 1924. Aug. 31–Sept. 30. No. 29. pp. 832–837.

The writer deals with a most excellent organization which exists in the Low Countries for the care of children whose parents are serving abroad in the Dutch East or West Indies. Many of these children left to private families are not properly looked after, their education is neglected, and sometimes even their living arrangements are unsatisfactory. The "Tokuni" is a society or bureau which takes the place of the parents.

CUNNINGHAM (J.) & RAGHAVACHARI (T. N. S.). **Recent Methods of Differentiating Lactose Fermenting Organisms, as Applied to Indian Conditions.**—*Indian Jl. Med. Res.* 1924. July. Vol. 12. No. 1. pp. 75–81. [20 refs.]

The authors have investigated the lactose fermenting bacteria obtained from water and faeces.

"The results of various investigators show that lactose fermenting bacilli can be divided into two main groups by the methyl red and Voges Proskauer tests, that the M.R.—, V.P.+ type are rare in the faeces of man and animals, are more common in surface water and sewage, and are the predominant type in grain and soil. These findings are in favour of the view that they are either the natural survivors of the lactose fermenters present in excretal matter, or are derived from soil or possibly grain, and consequently their presence in water and food products is to be regarded as of less sanitary significance than the presence of excretal *B. coli*."

"Summary and Conclusions.—We have examined the lactose fermenting organisms in a large number of samples of human faeces derived from both vegetarian and non-vegetarian communities, bovine faeces, and water from various sources of supply, with reference to the proportion of high and low ratio groups to be found in each, and have obtained the following results:—

"1. The percentage of the high ratio group (M.R.—, V.P.+) in the faeces of the Madras community as a whole is 2.1, the figures obtained from non-vegetarian and vegetarian sources respectively being 0.4 and 4.6.

"2. The high ratio group forms 0.5 per cent. of the lactose fermenting organisms in bovine faeces.

"3. In unfiltered water 29.8 per cent. of the lactose fermenting organisms belong to the high ratio group. There is no substantial difference to be found in the distribution of the two groups, if the samples are divided according to their source. (Rivers, impounded surface water and springs and wells.)

"4. Our results agree, therefore, with those obtained by other observers in different parts of the world.

"5. We have not, up to the present, been able to obtain any clue as to the probable source of the organisms found in water from this grouping alone."

We have always held the opinion that classifying faecal bacteria on a basis of fermentation tests in the laboratory is not likely to be of much service in interpreting the observed results of analysis of polluted water.

MIYAIRI (Keinosuke). **A Method of Investigation of the Nation's Health.**—*Japan Med. World.* 1924. Aug. 15. Vol. 4. No. 8. pp. 198–202. With 3 charts.

The author gives an account of an investigation in certain counties of Japan. He points out, to commence with:—

"1. The ever-increasing death of infants.

"2. The number of deaths of children is so many as compared with any other nations, and in any ages.

"3. The number of deaths from tuberculosis is gradually increasing. Particularly, no example is observed in any other civilized nations as Japan, where death of young women is notable."

He describes the method used in the investigation. Some of his results are as follows :—

“ If the results based on our investigations are referred to, about 90 per cent. of the examined persons had *Ascaris lumbricoides*, over 90 per cent. of them *Trichocephalus trichiuris*, about 20 per cent. of them *Ancylostoma duodenale*, over 6 per cent. *Trichostrongylus orientalis*, and about 22 per cent. *Schistosomum japonicum* . . .

“ 80.3 per cent. of the boys and 37 per cent. of the girls harbour the eggs of *Schistosoma* in the feces.”

He believes the main cause of the excessive infantile mortality to be *Ascaris*, and quotes a doctor who reached the same conclusion more than a hundred years ago. He considers that the frequency of hook-worm, strongyloides and schistosoma is largely responsible for the stunted growth of the Japanese. By way of remedy he considers that all nightsoil should be collected and allowed to ferment in a pit, before it is used for manure. By this simple procedure the eggs and larvae of the worms would be killed, and the manurial value of the nitrogen would not be lost.

CORREIA (Alberto Carlos Germano da Silva). **O clima, a nosografia e o saneamento de Loanda.**—*Revista Méd. de Angola*. (No. especial 1º Congresso de Med. Trop. da Africa Ocidental. Vol. 2. 2ª Sessão). 1923. Aug. No. 4. pp. 377–482. With 11 charts. [28 refs.]

This lengthy contribution is divided into three parts. The first is climatic and gives a statistical account of the temperature, humidity, rainfall, direction of the prevailing winds, atmospheric pressure and death returns in Loanda from the middle of the last century.

The second traces for the past 40 years the vagaries of the chief diseases, such as malaria, tuberculosis, cerebrospinal fever, dysentery, beriberi, enteric fever, yellow fever, plague, etc. From the malarial aspect, says the author, Loanda has improved since 1905. This is not borne out by the figures in the table given, for in the years 1918–1922, inclusive, the figures are, with one exception, higher than in any year since 1885. Tuberculosis has also increased its ravages; a table is given showing that the number of deaths recorded in 1885 was 59, whereas in 1921 it was 434, there being as many as 62 in the month of April alone.

A sub-division of this section deals with the more important epidemic diseases, such as yellow fever, plague and smallpox. An interesting discussion based on previous reports and records is given as to the time of introduction of the first-named into Africa, but the question is left unsolved. In the part dealing with plague there is a brief sketch of the epidemic which started towards the end of September, 1922, and attacked 90 persons in three months, amongst them 6 Europeans; two of the latter died and 48 per cent. of the native cases. Smallpox is shown to have been attended with a high case-mortality. In 1873, out of 427 cases, 93 terminated fatally; in 1881 there were 114 deaths among 192 cases. It is shown in a table that during the 9 months October, 1901–June, 1902, 475 deaths occurred from variola; the number of persons attacked, however, is not stated.

The third and last part of this paper treats of sanitation in Loanda and offers suggestions on the usual lines for disposal of excreta, provision of sanitary conveniences in the cities, purification of water, and the

necessity for dealing with beggars, who by their rags and vermin may introduce and spread disease.

The dwellings in Loanda are said not to be very suitable for a warm climate; they are generally small, ill-ventilated and badly lighted; warehouses and food-stores are not rat-proof, slaughter-houses are not constructed on modern lines and are, moreover, situated in the crowded parts of the town. The paper ends with suggestions for remedying these defects and for establishing disinfection and vaccination stations and a general health service.\*

DOS SANTOS (F. Ferreira). **Assistência médica aos indígenas e processos práticos da sua hospitalização.**—*Revista Méd. de Angola*. No. especial 1º Congresso de Med. Trop. da Africa Ocidental. Vol. 2. 2ª Sessão.) 1923. Aug. No. 4. pp. 51–71. With 7 figs.

This paper contains statistical returns and some excellent suggestions for providing proper treatment for the native, including preventive measures against disease. The importance of reliable statistics for gauging progress is rightly stressed, and also that of the study of the anthropology and ethnology of the races with whom the medical practitioner comes into contact. For dealing with smallpox vaccination-posts should be established, and care should be taken that re-vaccination is performed in due course; control of the sale of alcoholic drinks and prohibition of the manufacture of native fermented liquors are insisted upon. Prevention of the spread of leprosy, tuberculosis and syphilis by examination, treatment and segregation in suitable cases are mentioned. For investigation and advance of scientific work specialists should be appointed to a central laboratory. Two pages are occupied by clear plans of institutions denominated Sanitary Posts, Class I and Class II. The first is arranged for dealing with a certain number of bed cases and for infectious patients, with the necessary administrative and sanitary adjuncts; the second is on similar lines, but smaller, and is not suited for serious bed cases. The nursing staff of the former consists of one European and two natives, while for the latter one male native attendant is considered sufficient. In addition to the above there should be a district hospital (*Enfermaria regional*) with a medical man in charge, assisted by a second qualified doctor if necessary, and also a European dispenser, in addition to the nursing staff.\*

DA COSTA (Alfredo Gomes). **A higiene e a assistência clinica aos trabalhadores das Fazendas Agrícolas da Região do Amboim.**—*Revista Méd. de Angola*. (No. especial 1º Congresso de Med. Trop. da Africa Ocidental. Vol. 2. 2ª Sessão.) 1923. Aug. No. 4. pp. 367–375.

The number of patients receiving treatment from the "Health Delegation" of Amboim increased from 160 in 1921 to 421 in 1922, and during the first four months of the following year the figure had already reached 449. For the better care of the estate workers the author makes suggestions of which the following are the most important:—

(1) That the men, before being engaged, should be medically examined; (2) improvement of housing conditions and food; (3) that each estate should have an infirmary capable of accommodating

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\* Summarized by Dr. H. Harold Scott.



8-10 per cent. of the number of employees, under the care of a certificated attendant ; (4) that estates employing large numbers of workers should combine to obtain the services of a duly qualified medical man.\*

CARNEIRO E MENEZES (Manuel de Vasconcelos). **Assistência a alienados, anormais, inválidos e convalescentes.**—*Revista Méd. de Angola*. (No. especial 1º Congresso de Med. Trop. da Africa Ocidental. Vol. 2. 2ª Sessão.) 1923. Aug. No. 4. pp. 361-366.

The author points out the needs of Angola in respect of mental asylums, and suggests that two selected medical men should be sent to one of the asylums of France or Italy to study pathological psychology for a period of two years. On their return they should be stationed at some centre, and there train others to take up work as specialists at small observation stations established in important parts of the colony, such as Loanda, Benguela and Mossamedes. His main contention is that the work should be taken up again *de novo* and not merely adapted to the old lines and existing institutions.\*

SANT'ANNA (J. Firmino). **O problema da assistência médico-sanitária ao indígena em Africa.**—*Revista Méd. de Angola*. (No. especial 1º Congresso de Med. Trop. da Africa Ocidental, Vol. 2. 2ª Sessão). 1923. Aug. No. 4. pp. 73-178.

This contribution may be regarded as a small manual of public health based on Utopian principles. It is divided into six chapters. The first is a general statement of the varieties of morbid and insanitary conditions met with, and a draft of the measures proposed for combating them. The second is concerned with the rural population and their sanitary desiderata, such as pure water, the treatment of soil-pollution, dwellings, food, protection from noxious animals. The third deals with such hygienic problems as maternity and child-welfare, and the prevention of specific diseases. The fourth is devoted to the help which should be given to natives in the interior by means of travelling institutions and visiting doctors, small station hospitals, and special expeditions for dealing with particular problems such as ankylostomiasis, sleeping sickness, etc. In Chapter V. the question of the needs of populous centres is taken up, together with special matters such as alcoholism, the spread of tuberculosis and venereal disease, and the establishment of hospitals, dispensaries and clinics, and the training of native nurses. The final chapter contains remarks upon immigration, the introduction of infective diseases, recruiting and travel, and the provision of rest-houses. Even the prospect of establishing medical schools for the native is not forgotten.\*

CORREIA (Alberto C. Germano da Silva). **Os climas planálticos de Angola aproveitáveis para a instalação de estâncias sanitárias de altitude.**—*Revista Méd. de Angola*. (No. especial 1º Congresso de Med. Trop. da Africa Ocidental. Vol. 2. 2ª Sessão). 1923. Aug. No. 4. pp. 209-307. [42 refs.]

A hundred pages, almost entirely statistical, with short remarks upon the various health resorts in different parts of the world, in India, Ceylon, Central America, etc., and, in a little more detail, some of those in Angola.

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\* Summarized by Dr. H. Harold Scott.

The meteorological conditions and sanitary features of each are given, in several instances in tabular form, stating the maximum, minimum and mean temperatures, the rainfall, the number of cloudy days, and so forth, from 1913 onwards. Probably a reliable guide on such matters for intending visitors.\*

## REVIEWS.

LEAGUE OF NATIONS. **The Prevalence of Epidemic Disease and Port Health Organisation and Procedure in the Far East. Report presented to the Health Committee of the League of Nations** by F. NORMAN WHITE. (C.H. 130.)—179 pp. With 1 folding map. 1923. Geneva.

This is a noteworthy contribution to the literature, especially to that concerned with plague. The author writes with conviction; he deplors the assertiveness necessitated by condensation, and fears it is open to criticism. Controversy will probably arise, but a decisive attitude born of sound practical experience is sometimes acceptable.

The greater portion of the report deals with the numerous countries visited and provides a valuable record of local conditions and organization for preventive measures. Where defects were found they have not been overlooked, but mention has been made of them in such a manner that no objection should be raised.

The beginning of the report consists of observations on certain diseases, and views have been expressed that may call forth controversy. These views should, however, receive careful consideration.

Plague is first dealt with. The author contrasts the bubonic and the pneumonic types; he regards the diseases, though both due to the same micro-organism, as distinct as any two diseases can well be from the epidemiological point of view. He believes that the pneumonic variety is caused by the plague bacillus in symbiosis with another organism, and is a disease *sui generis*. It is admitted that this aspect is theoretical, and that the confirmation or refutation must rest on further laboratory investigation. He states that, if the existence of this hypothetical symbiotic organism be postulated, all, or nearly all, regarding the history and epidemiology of plague that is obscure in the light of present knowledge becomes clear.

He urges that, save under exceptional circumstances, bubonic plague does not give rise to direct transference of disease from the sick to the healthy. He admits that bubonic plague cases with lung involvement should be isolated and nursed with adequate precautions, but notes that these are frequently neglected with impunity in crowded Oriental towns. The significance of these facts is weighty. He considers the assumption that bubonic cases play an important part in the propagation of the disease is unwarranted, and has influenced sanitary conventions and port health procedure in many countries.

He proceeds to the importance of grain and of the grain trade in the spread of plague and gives three very simple rules for the rat-proofing of grain stores.

The importance of the species of rat found in relation to the prevalence of disease in man is emphasized, and attention is called from the same point of view to the significance of the species of flea infesting the rat. Following this the need for systematic rat examination in ports is advocated, as such should be of great value in locating foci of infection persisting during the non-epidemic season. The distribution of plague in Asia at the time of his tour is given, and remarks are added on measures required

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\* Summarized by Dr. H. Harold Scott.

at the port of departure, with present delinquencies. Municipal anti-plague methods are mentioned, and the possibilities connected with a "Rat Lottery" brought to notice.

A summary of conclusions contained in 31 headings brings the remarks on plague to a close.

The observations on Cholera and Smallpox contain information as to the value of anti-cholera inoculation and search for cholera carriers.

The next subject dealt with is "A Sanitary Convention for the Countries of the Far East." The existing convention is looked upon with disapproval by many Health Administrations in the Far East, primarily because it was designed to protect the West from the East. The East needs protection from itself. Centres of infection are so close at hand that the danger of transmission of disease is much more acute. It is not proposed to modify in any way the existing International Sanitary Convention of Paris, but to incorporate in it as a separate chapter a Far Eastern Convention, applicable only to those countries in the East who may elect to adhere thereto.

A draft of the suggested convention is given, and this should be consulted in the original. It deals with a large number of matters of great importance, and the proposed terms have been discussed by several Health Authorities concerned and have met with general approval.

The last article in this report deals with a "Central International Epidemiological Intelligence Bureau for the Far East," which might well take advantage of the existing organisation of the Far Eastern Association of Tropical Medicine. The proposal has been gone into in considerable detail, which must be left to the reader to assimilate.

The two last-mentioned proposals are of much importance and of a far-reaching character. If adopted, they should assist greatly in controlling the spread of communicable disease in the Far East.

G. E. F. Stammers.

WU LIEN-TEH [Director & Chief Medical Officer of the Service].

[Edited by.] **North Manchurian Plague Prevention Service. Reports 1923-1924. (Being Volume IV. of the Series.)**—pp. vi+314.

With 2 maps, 5 coloured plates & 29 illustrations.

This volume of reports, which is edited by Dr. Wu Lien-Teh, contains a number of articles on Plague, in addition to papers on such diverse subjects as "The incidence of certain diseases in Chinese and Europeans," "The serodiagnosis of syphilis," "Scarlet Fever in China," "How I built hospitals in China," "As a National Guest in Japan." The present review refers only to the articles on plague.

The first paper on this subject, entitled "A record of pneumonic plague outbreaks throughout the world from the earliest times," extends to rather more than one hundred pages, and may be regarded as a compilation, or historical study, of pneumonic plague outbreaks, or of epidemics of disease simulating pneumonic plague, which have been recorded in a number of countries in different parts of the world. The early records of this disease are culled from European sources, and it is disappointing to learn that this is necessarily so, because "no satisfactory records about the East can be obtained." One wonders whether this is really the case, or whether our ignorance is due to neglect to study existing records, for example, the records contained in old Thibetan sacred books referred to in another paper of the series.

The author's remarks on the epidemics of plague which are known to have prevailed in Transbaikalia, North Manchuria, and Mongolia are particularly interesting. He mentions some sixty outbreaks of this disease which occurred in Transbaikalia after the year 1863, and, from a study of these epidemics, he draws the following conclusions:—

"In the overwhelming majority of outbreaks, for which we have complete data, the initial cases were of the bubonic type. The preponderance of

axillary buboes is well marked." He attributes this latter phenomenon to direct infection while skinning wild rodents, and states that "the distribution of the buboes in the later cases shows a considerable number of inguinal in addition to numerous axillary and rare cervical ones," and it is his belief that these secondary cases are mainly infected through bites of human parasites which abound in the huts. "The rôle of the domestic rodents and their parasites has thus far," he states, "not been proved and seems improbable."

A perusal of the evidence on which these conclusions are based, however, is found to be exceedingly meagre; the author himself admits that the figures he has obtained "lack exactness in some respects."

There are also many accounts of outbreaks of plague in Mongolia after the year 1860, but, as the author points out, "the records were not collected by a trained personnel, but by occasional expeditions to the affected areas after the events, and thus often lack essential details."

It is not to be wondered at, therefore, that the author's conclusions from this historical study are vague. He believes "that meteorological conditions form only one link in a chain of extrinsic factors which favour the spread of pneumonic plague," certain "intrinsic factors" have also to be considered, "the character of the rodents and fleas involved, the changing nature of the plague organisms under varying circumstances, etc." It is his belief that these latter factors help to mould the character of epidemics and to explain why pneumonic plague appears almost regularly in certain districts and infrequently in others.

The reviewer believes that the author has not stressed sufficiently the influence of ignorance and of overcrowding in the spread of pneumonic plague, although, for example, he draws attention to these facts in connexion with the Manchurian epidemic in 1910. He points out that there the increased demand for tarabagan skins in the world markets attracted a large host of hunters to formerly infrequented districts. He states that the inexperienced Chinese hunters did not understand the danger of handling sick and diseased tarabagans, "hence they caught tarabagans indiscriminately with snares, and even congratulated themselves when they saw a sluggish one." "One sick animal," he points out, "might provide the spark for an epidemic." "Inexperience and overcrowding in underground inns would supply the necessary fuel for its spread." Had the author emphasized these points his findings would have been in accord with those of PETRIE and TODD, who show that:—

(1) "Outbreaks of pneumonic plague take their immediate origin from patients with bubonic or septicaemic plague in whom a secondary pneumonia has supervened; they may assume the form of scattered foci in localities in which a bubonic epidemic is proceeding (mixed outbreaks) or they may occur as pure epidemics.

(2) "Ignorance of the means of self-protection, deficiencies in sanitary administration, and the absence of proper ventilation are the primary circumstances that encourage the spread of the disease."

The reviewer has stressed these points because the conclusions to be drawn from this historical study are so entirely at variance with the views recently advanced by Dr. Norman WHITE in a report presented to the Health Committee of the League of Nations, in which he states, after an examination of all the available epidemiological data, that "the plague bacillus *alone* does not and cannot cause widespread epidemics of pneumonic plague. It seems more probable that there is an additional organism at work, or, in other words, the plague bacillus in symbiosis with another organism is responsible for epidemic manifestations of pneumonic plague, which is a disease *sui generis*."

A second paper by Dr. Wu on "Plague in wild rodents" was originally read at the Far Eastern Congress of Tropical Medicine held in Singapore in September, 1923. This paper contains many references to the literature on this subject. Tables are appended to the paper, which give: (1) A list of rodents known to suffer from spontaneous plague; (2) a list of rodents

not known to be naturally infected, but which are susceptible to plague infection; (3) the rodents of Transbaikalia; (4) certain cases of plague among tarabagans; (5) a list of fleas found on rodents suffering from natural plague.

A third paper by Dr. Akira FUJINAMI and Wu Lien-Teh is entitled "A study of the morbid histology of the 1921 Manchurian Plague Epidemic." The histological appearances of various organs in a number of cases of pneumonic plague are described and illustrated. A fourth paper contains "notes on the histological lesions found in organs of naturally plague-infected tarabagans." The notes are compiled on the examination of seven plague infected animals. In four of the seven cases acute broncho-pneumonia was noticed, which suggested to the authors that these particular animals had died of "pulmonary" plague; nevertheless, they conclude that the lesions so far observed seem to point to infection of the tarabagan through insects, as in rat plague, "the lung conditions being due to secondary invasions from other quarters." They, however, draw attention to the close association of tarabagan plague with primary pneumonic outbreaks in man.

A fifth paper, entitled "The original home of Plague," was first published in the *Japan Medical World* on January 15th, 1924. This paper, as the author, Wu Lien-Teh, remarks, is gathered from the work of past authors. He comes to the conclusion from a study of their writings that it is difficult to draw any sharp line as to where one focus begins and another ends. So far as Asia is concerned he holds the view that the whole central plateau is one large epidemic area, and affirms that here the virus is constantly kept alive among the various species of susceptible rodents which suffer from periodical epizootics. Such visitations in their turn result, at one time or another, in human cases. He stresses the point that the original virus may rest in wild, rather than domestic rats.

The last paper of plague is a summary of certain experiments with lice obtained from tarabagans. The author, Dr. H. JETTMAR, states that the tarabagan louse can suck the blood of man, the ground squirrel, and the guineapig, but will not live on a strange host for any length of time.

In one experiment, by placing forty lice collected twenty-four hours previously from a dead plague-infected tarabagan on a healthy sirel (*Spermophilus Eversmanni* Brandt), he succeeded in infecting the animal.

W. Glen Liston.

**PHILIPPINE ISLANDS. Proceedings of the First National Conference on Infant Mortality and Public Welfare. Organized and conducted by the Office of the Public Welfare Commissioner and held under the Patronage of His Excellency Leonard Wood, Governor-General of the Philippine Islands, Manila, 1921. December 6, 7, 8, 9, 10.—267 pp. With frontispiece and 9 plates. 1922. Manila: Bureau of Printing.**

The opening words of the address of the Presiding Officer are surely sufficient to justify the object of the Conference, for he says: "Out of every thousand children born in the Philippine Islands, three hundred and twenty die under the age of one year." There is indeed work to be done, but one feels that the mind of the Filipino people has been truly set to the solution of the problem, and not without great hopes of success. It is known to a great extent where the causes of this sad state lie, and in most cases the appropriate remedy to ameliorate or, indeed, to abolish much of the evil is available.

As is so often the case, the main need is for education, for by that means alone can success be obtained. Legal enactments often fail in their object, but enlightenment of the populace brings into play just ordinary common sense—that most valuable asset in all sanitary reform.

At the beginning of the proceedings one reads in the paper on "Faulty Maternity Practices and their influence upon Infant Mortality," of superstitions, customs, mistaken practices and treatments which knowledge only can hope to abolish.

An interesting paper on "Infantile Beri-beri : its Causes and Remedies" states that this malady is responsible for more deaths than diseases of the respiratory tract, the digestive tract, meningitis, tuberculosis and tetanus combined. Valuable information and advice is given to mothers whereby they may recognise the early signs of the disease in infants, and wise counsels are propounded for the campaign against this most fatal malady.

An excellent illustrated paper was given on "Tuberculosis and the Child." Much that is mentioned is not only applicable to the Philippines, but is equally valuable in any part of the world.

An interesting sidelight is shown by a perusal of the discussion following the paper entitled "The Functions and Duties of a Health Officer"; apparently that much abused individual, the sanitary inspector, does not in all cases give satisfaction. It is, however, undoubtedly true that an efficient and tactful body of inspectors is an enormous asset in sanitary advancement, and may almost be described as the backbone of organization. The careful choice and adequate instruction of persons desiring to take up this branch of work is essential, and is a matter to which much attention and care is now given in this country in the preparation of men to take posts abroad in Colonial and other Services.

Amongst other papers of particular note one may mention "The Public Welfare Nurse and her Sphere of Action." Much wise advice, assistance and suggestions are therein contained; but one almost feels that here, too, as elsewhere, "woman's work is never done."

The papers throughout the sessions are generally to the point, helpful and practical, and will repay study by all those interested in the subject, whether lay or professional.

G. E. F. Stammers.

STEWART (Alan W.). [D.Sc., A.I.C., Demonstrator of Chemistry at the Royal Inst. of Public Health, London.] **A Manual of Practical Chemistry for Public Health Students. Especially arranged for those studying for the D.P.H.** 2nd Edition.—pp. x+83. With 16 figs. 1924. London: John Bale, Sons & Danielsson, Ltd., 83-91, Great Titchfield Street, W. 1. [Price 5s. net.]

This volume has been designed to supply the necessary practical chemistry exercises for D.P.H. students working under the present regulations.

It is evident that careful choice of methods has been made and the descriptions of the various processes are set forth adequately, clearly and concisely, but some important methods have been omitted. There is, for example, no mention of Haldane's apparatus for air analysis, nor of the Gerber or Rose-Gottlieb methods for the estimation of fat in milk. In view of the widespread use of Gerber's method in dairy and public laboratories some knowledge of the process is essential for public health students. In a paragraph dealing with the deterioration of bleaching powder we regret to find no reference to the prevention of this deterioration by the addition of quicklime. And there should now be no necessity for quoting American figures for the composition of flour when an authoritative series of British food analyses has been compiled by PLIMMER and published by H.M. Stationery Office.

Actual mistakes are very few. In two places the word "nitrates" should read "nitrites"; the food value of milk refers to kilo-calories and not to gram-calories, as printed; and in the conversion data on page 77 several of the terminal decimal figures require correction.

The volume is usefully interleaved with blank pages on which the student may enter additional notes, and, though there is no index the table of contents is very full. Here and there the paragraphing could be improved and practically all the illustrations could be omitted without loss. It is difficult, for instances, to discover what teaching value can attach to an illustration of a Nessler tube or a measuring flask in a manual intended for actual use in the laboratory, while the illustration of the Paterson "Chloronome" on page 13 appears superfluous, as a similar illustration may be found amongst the advertisement pages.

Subject to these minor criticisms this book represents one of the best student's handbooks which we have seen of recent years, provided the student realizes and keeps in mind that it is intended solely as a laboratory bench book for D.P.H. work, and that it lays no claim to be a text book on public health chemistry.

J. A. Anderson.

FOWLER (James K.). **An Impression of Jamaica and the Panama Canal Zone.**—60 pp. 1924. London: Eyre & Spottiswoode, Ltd., 9, East Harding Street, E.C. 4. [Price 2s.]

There is much matter in this little book and not a little humour, but our attention must be fastened on its serious professional interest.

The author visited Jamaica and the Panama Canal as one of many distinguished guests invited from afar by the United Fruit Company (of New York) to conjoin in a conference on the health problems of Tropical America, where so much of the productive work of the Company is carried on, and the Conference was duly held at Kingston (Jamaica) in the 11 days ending 1st August, 1924.

The Company is said to be the largest grower in the world, and for distributing its kindly fruits it has a line of steamships of its own; and thus being in such intimate and comprehensive touch with the realities of Mother Nature, it understands that sanitation pays. Thus possessed of wisdom and understanding it has set up, as a bulwark against tropical Nature, a Medical Department in which 50 doctors, 43 registered nurses, and 425 workmen are employed, and which includes in its very replete equipment pathological laboratories where disease can be investigated in its causes. When the Company takes over a new estate the first procedure is to erect a hospital and dispensary and mosquito-proof farm-buildings and labourers' dwellings, and to instal a water-supply and all necessary sanitary appliances. Schools, churches, and places for indoor and outdoor recreation also come within the ample sweep of the Company's provision for the mental, moral and physical welfare of its employees.

Of the proceedings of the Conference the author does not say very much. Of one of the items discussed, namely, the possibility, in the fullness of knowledge and sanitary experience, of the white races adapting themselves to a tropical habitat, he tells us that the Conference, "not without dissentient voices," was inclined to countenance it. He confesses himself to be among the dissentients, and supports his dissent with many familiar arguments—in the forefront of them Indian experience [which, however, is based not so much on any carefully studied effects of a hot climate on Anglo-Indian children as on difficulties of education in India, and particularly of moral education in an atmosphere pervaded by the gossip—at the best Rabelaisian—of native menial servants]. He also comments on AGRAMONTE'S challenge, made to NOGUCHI at the Conference, to decide the pathogenic status of *Leptospira icteroides* by inoculation of human volunteers.

In his impressions of Jamaica the author ridicules the relegation of sanitary responsibilities to Parochial Boards, and recommends that the powers and duties of Parochial Boards should be transferred for a time to a special Commission nominated by the Governor and approved by the Secretary of State for the Colonies. In his impressions of Panama he puts a heavy

stamp on a recent official recommendation to restrict expenditure on sanitation in the Canal Zone to the amount necessary to safeguard the health of American employees, and argues that the health of crews of ships using the Canal and of the settlers in the Zone are matters of such far-reaching import that they cannot and must not be ignored. He also has some pertinent criticism of the comfortable belief that because yellow fever is being suppressed in the Western Hemisphere that disease is on the way to complete extinction everywhere.

A. Alcock.

NEVEU-LEMAIRE (M.). **Principes d'hygiène et de médecine Coloniales.** --pp. vi+278. With 133 figs. 1925. Paris: Société d'Éditions Géographiques, Maritimes et Coloniales, Ancienne Maison Challamel, 17, rue Jacob (VI<sup>e</sup>). [Price 16 francs.]

This admirable little book, though intended rather for the sojourner and traveller in strange lands than for the medical profession, can be heartily commended to the young doctor going to work in the overseas dominions. For sovrán comprehensiveness combined with neat and effective concentration, it may be likened to the kingdom of infinite space bounded in a nutshell, of Hamlet's fancy. Of its fourteen chapters the first three are concerned with tropical climates in their physiographical aspects and in their direct and indirect influences upon the human framework; here among much that is useful to remember will be found also some speculations on the direct but retarded effects of the solar heat that will evoke dissent. The next seven chapters contain succinct accounts of the several diseases commonly known as tropical, grouped partly according to their malefic status and partly according to their geographical distribution and Continental limitation. This arrangement, though it disregards academic conventions, is quite concordant with the purpose of the book, and but for a few deliberate and avowed inconsistencies (*e.g.*, in the allocation of kala azar and rat-bite fever and sprue), is conveniently carried out. The descriptions of the individual diseases are models of precision, particularly in respect of the natural history of pertinent parasites and intermediary hosts and apposite measures of control, and are copiously illustrated by maps, diagrams, and artistic figures. A separate chapter is given to the cosmopolitan diseases as they occur in the tropics: this, of course, is sketchy though by no means perfunctory. A long chapter is occupied by the animals noxious to man in tropical regions, which are separately grouped as predators, parasites, intermediary hosts, animal "reservoirs," and venomous and poisonous forms. In a minimum of words, supplemented by excellent figures, this chapter imparts an enormous amount of information on the blood-sucking arthropods, the leeches, and the parasites (maggots, helminths, protozoa) and the various intermediate hosts not previously noticed in connection with the great endemic and epidemic diseases, and also on venomous snakes and fishes and venomous and poisonous invertebrate animals of many kinds. The penultimate chapter on some noxious tropical plants is meagre and unsatisfying, but the final chapter on domiciliary and domestic and personal hygiene is excellent both in matter and in manner.

A. Alcock.





TROPICAL DISEASES BUREAU.

# SANITATION SUPPLEMENTS

OF THE

TROPICAL DISEASES BULLETIN.

## APPLIED HYGIENE IN THE TROPICS.

By LT.-COLONEL G. E. F. STAMMERS, O.B.E., R.A.M.C. (retd.)

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SUPPLEMENT No. 2.]

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[JULY 30.

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### DISEASE PREVENTION.

LEAGUE OF NATIONS HEALTH ORGANIZATION. **Minutes of a Conference held in Singapore, from Wednesday, February 4th, to Friday, February 13th, 1925, inclusive, regarding the Establishment of an Epidemiological Intelligence Bureau for the Far East.**—35 pp.

In his report to the Health Committee of the League of Nations in 1923 Dr. Norman WHITE wrote of the proposal to establish a "Central International Epidemiological Intelligence Bureau for the Far East" (*vide* Sanitation Supplement, March 30th, 1925).

As the Representative of the League of Nations Health Organization, Dr. Norman WHITE was President of the Conference, and the following were present as delegates: Lt.-Col. J. D. GRAHAM, I.M.S. (British India), Dr. P. A. DINGLE (British North Borneo), Dr. L. NICHOLLS (Ceylon), Dr. S. C. YIN (China), Dr. A. R. WELLINGTON (Federated Malay States), Dr. l'HERMINIER (French Indo-China), Dr. T. B. ADDISON (Hong Kong), Dr. Ganzo KATOH (Japan), Dr. J. J. van LONKHUIJZEN (Netherlands East Indies), Dr. H. F. SMITH, as Observer (Philippine Islands), H.S.H. Prince SAKOL (Siam), The Hon. Dr. A. L. HOOPS (Straits Settlements). Dr. Gilbert E. BROOKE was the Secretary.

The Conference made the following recommendations:—

"I. That the first appearance, in any port in Asia and Australia east of Suez, frequented by foreign trade ships, of indigenous cholera, human or rat plague, smallpox, yellow fever, or unusual prevalence or mortality from any other infectious disease, shall be telegraphed to the Bureau without delay.

"II. That a weekly telegram to the Bureau be sent not later than Wednesday morning of each week, referring to the previous week ending Saturday midnight. The contents of the weekly telegram to the Bureau should be as follows:—

- (1) Total deaths from plague in important ports.
- (2) Plague infection among rats in important ports.

- (3) Total deaths from cholera in important ports.
- (4) Total deaths from smallpox in important ports. (Reporting of cases of smallpox where possible.)
- (5) Particulars of any unusual epidemics in any part of the territory of the countries interested.

"The following is a tentative list of 'important ports' in the countries represented at the Conference :—

Bombay.	Singapore.	Belawan (Deli)	Hankow.
Calcutta.	Saigon and	Hongkong.	Darien.
Madras.	Cholon.	Manila.	Fusan.
Karachi.	Bangkok.	Foochow.	Yokohama.
Rangoon.	Batavia and	Amoy.	Kobe.
Negapatam.	Tanjong Priok.	Swatow.	Moji and
Colombo.	Sourabaya.	Canton.	Shimonoseki.
Penang.	Semarang.	Shanghai.	Keelung.
	Macassar.		

"III. That the letter confirming the weekly telegram, to be despatched by the first available post, shall contain also the following information :—

- (a) Total deaths from all causes, in important ports.
- (b) Number of cases of, as well as deaths from, each of the above-mentioned diseases.
- (c) Supplementary information regarding plague, cholera, smallpox, or other unusual epidemic referred to in the weekly telegram.
- (d) Any information of importance to the Bureau gathered from other sources such as Bills of Health, etc.
- (e) Particulars of any infected ships which have arrived during the week, *e.g.*, name, nature of infection, whether treated or otherwise, whence come, and whither proceeding.
- (f) Information regarding health conditions in ports of secondary importance, similar to that supplied for 'important ports,' wherever possible.

"IV. That all reports of public health interest dealing with the ports and territories as a whole, as well as copies of public health legislation, shall be sent to the Bureau in duplicate, *e.g.*, annual health reports; reports from medical research institutes; scientific papers; municipal health reports of seaport towns, and monthly meteorological reports.

"V. That the Bureau telegraph to all far eastern governments and to Geneva each week, a resumé of all the telegraphic information it has received during the week from the countries in the Far East as well as other information of sufficient importance, and that emergency telegrams be sent to the countries concerned as circumstances dictate.

"VI. That the Bureau be authorized in case of urgency to telegraph information direct to any Port Health Officer in the Arena (the Eastern Arena includes all territory between longitudes 20° and 160° East of Greenwich, and latitudes 40° N. and 40° S.). When such action is taken, a duplicate telegram will be sent at the same time to the Central Administration.

"VII. That the weekly telegram be sent from the Bureau in code, and, if possible, broadcasted by wireless, on a fixed day and hour.

"VIII. That the communication confirming the weekly telegram emanating from the Bureau should take the form of a 'leaflet,' in which the health news, from any source, of interest to eastern countries, be incorporated, and that monthly and annual publications be also issued by the Bureau.

"IX. That, pending the completion of arrangements for a code, eastern administrations should arrange to telegraph summarized weekly information in plain language regarding health conditions, on the lines laid down in resolution No. II, as soon as possible after the return of the delegates to their respective countries. On receipt of this information the Bureau will commence broadcasting in plain language on a day and time which shall be duly communicated to all concerned.

"X. That an endeavour be made to obtain and distribute regular reports from Camaran, El Tor, Jeddah and Mecca during the time of pilgrimage.

"XI. That an endeavour be made to obtain regular information from Egypt and the east coast of Africa as far south as Cape Town.

"The Conference hopes :—

"XII. That the full co-operation of the various administrations of the Eastern Arena, not represented at the Conference, will be forthcoming.

"The Conference considers :—

"XIII. That some form of Advisory Council would be of great value to the development of the activities of the Bureau. Its constitution would naturally be international, and it is recommended that it function as a special commission of the League of Nations Health Committee to whom it would report. It would take note in an advisory capacity of any or all of the activities of the Bureau. It should meet once a year, and urgent questions arising in the intervals between sessions should be dealt with by correspondence.

"The Conference recommends :—

"XIV. That every facility be given by the Bureau to medical officers deputed by any of the Far Eastern administrations to study the work of the Bureau or to carry out investigations with the material available therein."

- i. MORA (Damas). **Les organisations sanitaires en général. Organisation sanitaire de l'Angola.**—*Revista Méd. de Angola*. (No. especial 1<sup>o</sup> Congresso de Med. Trop. da Africa Ocidental. Vol. 1. 1<sup>a</sup> Sessão.) 1923. Aug. No. 4. pp. 173-183.
- ii. RODHAIN (J.). **Rapport sur l'organisation générale du service médicale au Congo Belge.**—*Ibid.* pp. 185-191.
- iii. VASSAL (J.). **Aperçu général sur l'assistance médicale indigène en Afrique Equatoriale Française.**—*Ibid.* pp. 205-206.
- iv. VASSAL (J.). **Utilisation des noirs en Afrique Equatoriale Française comme auxiliaires du Service de Santé.**—*Ibid.* pp. 221-225.
- v. HECKENROTH (F.). **L'oeuvre d'assistance médicale indigène en Afrique Occidentale Française.**—*Ibid.* pp. 207-219.

The first session of this, the first Congress of Tropical Medicine of West Africa was occupied by the consideration of the sanitary organization of the West African Colonies; seven papers in all were contributed.

i. Dr. Damas MORA, Chief of the Health Service of Angola, read an excellent paper. Points made were that the preventive side of sanitary organization must take precedence of the therapeutic; that scientific research must be prosecuted on a large scale; that epidemics of diseases which cause much alarm and on which money is spent freely, such as plague, are rarely so destructive as those which are always present—malaria, tuberculosis, dysentery, hookworm, pneumonia; that the health service ought always to be completely mobilized. The sanitary organization of Angola was military till 1919, when it was put on a civil basis. The figures of the personnel, full complement and actual, are as in the Table:—

	Doctors.	Pharmaceuticalists.	Lab. Assistants.	Infirmiers and Infirmières.	Midwives.
Complement	80	19	20	170	2
Actual	...	51	14	+ 107 (native) 115 + 76 (native)	+ 2 (native)

A committee is providing for the foundation of an Institute of Scientific Research and arranges for the publication of the *Revista Médica de Angola*. Doctors who attend specialist courses while on leave are paid as if they were on service in Angola and, if they are working abroad, an additional sum of £2 per diem. There are three laboratories for clinical research and several portable laboratories (laboratoires portatifs). Every six months £820 worth of quinine is received from Holland and distributed gratis. There is a small pharmaceutical laboratory, where tablets, ampoules and other medicines are prepared, which has effected a saving of 150,000 crowns yearly. The personnel requires to be largely increased in all its grades; it is calculated that three to four thousand native infirmiers are needed! Advances for the immediate future are: a distinction between medical and sanitary officers, the creation of a native school of medicine, the study of the distribution of infective diseases in the Colony, the organization of a medico-legal service.

ii. Dr. J. RODHAIN, Principal Medical Officer of Belgian Congo, reported on that country. After the war the medical service was reorganized, to consist of three categories of doctors: administrative; medical officers at stations or itinerant; specialists, hygienists and parasitologists. On the administrative side, besides the P.M.O. and his deputy, attached to the Governor-General, there is in each of the four Provinces a medical officer assisted by one or more travelling medical inspectors. The hygienists at present number only two, in the Katanga and Congo-Kasai provinces where the Europeans are densest and large numbers of natives are employed; they are concerned chiefly with industrial hygiene. Three laboratories are now in being, at Leopoldville, Elizabethville and Stanleyville; a fourth will be placed at Coquilhatville. The itinerant doctors, who should number 48, are actually only 20, and these are all engaged on sleeping sickness prophylaxis. They and six others are specially concerned with the care of sick natives. There are 11 private doctors with whom the Government has contracts for the care of its agents and of natives. The medical personnel in the Colony should number at least 100, apart from absence on leave. Actually, there are 9

leave provision included. Apart from sisters of religious missions, there are 24 infirmières. The European assistants who, the author says, correspond in part to our sanitary inspectors and in part to the French military infirmiers, receive, like the infirmières, instruction at the Brussels school of tropical medicine, and afterwards at the hospitals and laboratories of Leopoldville and Elizabethville. Promotion is dependent on the passing of tests. There are now 22 European assistants and 4 pharmacutists. As to native auxiliaries there now exist in the Colony six schools, where natives receive a three years' course in which they learn, *inter alia*, how to diagnose microscopically trypanosomiasis, common helminth infections, and tuberculosis. There are not, at present, any native midwives. Great difficulties are the want of education in the pupils and their lack of moral qualities. These schools are the first step towards the training of native doctors, an essential task. "Nous devons venir en aide aux indigènes par les indigènes." An auxiliary service for the care of natives is formed by missionaries. They receive the same training as the European assistants. They have to furnish reports, and are under the control of the service of hygiene of their province. They are provided with microscopes and a yearly supply of drugs. There are now 15 missionary doctors and 30 unqualified missionaries.

The budget for 1923 was 12,500,000 francs, and 1,800,000 for purchase of equipment. The scale of pay for all grades is given in an Appendix.

iii. Dr. J. VASSAL, Director of the Health Service, French Equatorial Africa, contributed a short paper. The medical organization of this country, which comprises four colonies, dates from 1910, when the service was military. There are now 7 doctors for the native service in Moyen-Congo, 4 in Oubangui-Chari, 9 in Gabon and 2 in Tchad. Native infirmiers are numerous. The doctors charged with sleeping sickness prophylaxis give aid to the natives, vaccinate, treat syphilis and yaws and look after the hygiene of the villages. The military and railway doctors, and doctors attached to companies and missions have a share in this work. The scarcity of the personnel is a great drawback; the utilization of native assistants would remedy this, but the number of educated natives is insufficient. "The advance of native assistance and of native education is bound up together." In 1922, 126,157 vaccinations were done, and 28,589 persons were treated for sleeping sickness. In the budget for 1923, 2,480,984 francs were provided, one-tenth of the total expenditure. [If the figures are correct the proportion is one-twelfth.]

iv. Dr. VASSAL reported also on the employment of the natives of French Equatorial Africa as auxiliaries of the health service. Here there are no native doctors of any grade. The mental and social status of the population is not sufficiently high for the foundation of a school of medicine. But the natives make useful infirmiers and acquire much dexterity; their help is essential for the hygienic advance of the country. (*Quelle chimère de vouloir continuer à sauver l'ensemble des Noirs par les Blancs!*) In sleeping sickness prophylaxis the administration of atoxyl to old cases has been entrusted to them; the alternatives are to make such use of natives or leave the sufferers untreated. The most intelligent natives come from Gabon and Loango. An attempt is being made to use the native women as infirmières and midwives and a training school has been started at Libreville.

v. Surgeon-Major F. HECKENROTH, Inspector of Hygiene of French West Africa, discussed the arrangements for native medical assistance in that country, which comprises eight colonies, five of which are maritime. Twenty years ago they were grouped under a Governor-General resident at Dakar. This vast country of 3,500,000 square kilometres holds a population of about 12,000,000. The hospital beds at disposal number 2,500, a proportion of which are for lying-in women. Laboratories are working now in Senegal, the Soudan and the Ivory Coast; that at Dakar has become the Institute of Biology. There are, for the manufacture of vaccine, 11 centres which furnish sufficient lymph to vaccinate a million persons yearly; they are directed by doctors or by veterinarians. The Dakar School of Medicine, founded in 1918 (*loc. cit.* Vol. 21, p. 310), is turning out native doctors and pharmacutists and native midwives. To co-ordinate the sanitary administration of the various colonies a Central Bureau for the general inspection of sanitary and medical services was created, charged with the control of the existing organizations and the study of their improvement, at the head of which is the Surgeon-General, who is also Inspector-General of the sanitary services. He has a medical assistant and an Inspector of Hygiene, whose duty it is to inspect and survey the services of hygiene and prevention in the colonies of the group. The Inspector-General is the technical adviser of the Governor-General who can also consult a number of Committees. The personnel of the native medical assistance comprises 99 doctors, but 18 of these are employed in hospitals, and 5 are specialists, leaving 76 for general purposes. This is a decline from the figures before the war, which were then too small. At the end of 1923, 15 native doctors were expected to complete their course of training, and four years later 54 would be available. Of the native midwives 28 were already (1923) on duty, some at hospitals in the chief towns, others in the interior where maternity hospitals are being erected alongside the dispensaries. The infirmier personnel consist of 18 male and 4 female Europeans and 393 natives. There are 57 vaccinators, 226 "gardes d'Hygiene," and 45 "gardes sanitaires." In 1922 the amount spent on the native medical assistance was just under 10,000,000 francs.

The author proceeds to discuss the results of these activities. Apart from the increased figures of hospital attendance smallpox has almost disappeared; for 10 years more than a million persons have been vaccinated yearly with the local lymph; in remote regions dried vaccine has been used, at greater cost, but with good results. Yellow fever has become rare and much has been done to combat malaria. At Dakar there are 8 quinine distributors, who visit the houses from May to November and see the quinine swallowed three times a week by children under 15; in the schools the masters are the distributors. Sleeping sickness has become rarer. In the case of plague which appeared at Dakar in 1914 there is a standing campaign against rats, of which 700,000 to 800,000 are killed yearly in Senegal. In the case of other diseases success has been less, *e.g.*, leprosy, tuberculosis, syphilis. There are some 12,000 lepers, only a few hundreds of whom are segregated. The prophylaxis of syphilis has hardly been outlined even in the towns.

The paper ends with some forecasts of improvements. Much is expected from the collaboration of the native doctors and midwives; it will set the European doctor free from constant dispensary attendance

and allow him to traverse his district and study its needs. A motor car must be put at his disposal; there are already 8,000 kilometres of roads. The best type of car has not yet been devised.

A. G. B.

**LETONTURIER.** *Notes sur l'Assistance Médicale Indigène dans les territoires du Cameroun.*—*Revista Méd. de Angola.* (No. especial 1º Congresso de Med. Trop da Africa Ocidental. Vol. 2. 2a Sessão.) 1923. Aug. No. 4. pp. 351-358.

The author remarks that although the German medical organization of the Cameroons was good its working apparatus had been destroyed before the French occupation. The German medical estimates for 1914 amounted to 510,400 marks; the French medical budget for 1923 was estimated at 1,144,874 francs, under the following heads: Salaries, wages and allowances, 533,146 ff.; medical material and other provision for the sick, 541,500 fr. (*exclusive of* 70,228 fr. for public health purposes and 245,523 fr. for sleeping-sickness prophylaxis); leprosaria, 44,228 fr.; vaccines, sera, etc., 26,000 fr. Buildings, construction, and transport are not included in these estimates.

The medical personnel of the Cameroons forms an autonomous department of the Government. It consists of a D.G., a Sanitary D.D., 14 military M.O.'s, 2 civil M.O.'s, 1 railway M.O., and a pharmacist, and a subordinate medical establishment of 110 hospital assistants, of whom 10 are European (2 of them ladies), and the rest native. Of these last the value is variable; some of the older men are very good, and a few are "auxiliaires précieux."

In the chief centres of the territory 8 general hospitals are distributed having a total accommodation (beds) for 49 Europeans and 488 natives; in the suburbs of the capital there are also 3 dispensaries. Other district accommodation for the rural sick makes up a total of 5,000 "lits de hospitalisation." For vaccination there are two centres, from which 310,000 doses of vaccinia pulp were issued in 1922. A beginning has been made with provision for maternity, but so far only desperate cases have applied for attention.

A. A.

**LE DANTEC (A.).** *L'Hygiène Sociale à Dakar.*—*Revista Méd. de Angola.* (No. especial 1º Congresso de Med. Trop. da Africa Ocidental. Vol. 2. 2a Sessão.) 1923. Aug. No. 4. pp. 309-348. With 2 charts. [4 refs.]

Dakar, the capital of French West Africa, is a city and port of 32,000 inhabitants (exclusive of the naval and military establishment), of which 2,500 are Europeans and 29,500 are natives. The marine and military, of course, live under strict sanitary rule, but the civilians of all races are mingled in insanitary confusion. The necessity of segregating an ignorant native population indifferent to the blessings of hygiene is, of course, recognized, and something in that direction has been begun; but it will be long before it is accomplished, and meantime the official sanitary defensive is organized and adapted for existing conditions.

The Dakar Institute of Social Hygiene is grafted on the Dakar School of Medicine, and is financed by Government. It appears to exercise its sanitary influence mainly by the steady, silent, permeation of its dispensaries. These, which are nine in number, make several



provisions for general medical cases ; surgical cases ; eye, ear, pharynx and teeth ; skin ; tuberculosis ; venereal disease ; gynaecology ; pregnancy and approaching maternity ; and nurslings. The tuberculosis dispensary includes a laboratory for tuberculosis research. The venereal dispensary includes a proselytizing agency and a service for (non-obligatory) inspection of unfortunate females. The skin dispensary includes lousing apparatus. The infants' department includes a crèche and a hospital annexe. Some useful domiciliary sanitation is effected through Sanitary Visitors, provided by the School of Medicine ; these visitors help at the dispensaries, where they get to know the patients and to establish that mutual confidence which is the basis of progress. A good point d'appui is also afforded by the schools, where sanitary inspection has been established.

A. A.

D'ANFREVILLE DE LA SALLE. **L'Organisation de l'hygiène coloniale.**—*Ann. d'Hygiène Publique Indust. et Sociale.* 1924. Nov. New Series. No. 11. pp. 676-685.

This is an argument in favour of the general independence of the public health service. The author points out that even in France the interests of hygiene are subordinated to local politics, and that this is much more the case in the colonies, where the medical officers are all under official control. He admits that much has been done for the sanitary improvement of the French colonies, particularly in North and West Africa, and that there are and have been Colonial Governors of exceptional wisdom and ability who have actually initiated great sanitary reforms ; but on the whole the French and also the British colonies and dependencies have not reached the standard set by the United States of America. To attain this standard not only should the colonial medical officer be as much a hygienist and a man of affairs as a clinician, but there also should be in every colony a public health service, the subordination of which to the local government should be definitely regulated by statute. A given territory should be divided into districts (every important town to rank as a district), each with its sanitary officer commanding, under the supreme head. This public health corps should have its own subordinate staff of inspectors, vaccinators, disinfectors, and a considerable number of workmen ; also its own laboratories, as well as certain rights of call on the dispensaries of the ordinary medical service. Big schemes of sanitary engineering would be undertaken by its desire. A local administration, even the general public, could never ignore the recommendations of such an august hierarchy of Hygiene. But only with the recognition of the Public Health Service as an autonomous department of the State will the colonial hygienist be able to put his heart into his noble calling.

A. Alcock.

OLITZKI (Leo). **Die sanitären Einrichtungen Palästinas.** [The Sanitary Organizations of Palestine.]—*Deut. Med. Woch.* 1925. Mar. 6. Vol. 51. No. 10. pp. 402-403.

The author describes the institutions for the furtherance of hygiene and discusses the chief diseases of Palestine. Leaving aside the organizations for which the Mandatory Power is responsible, the chief of the Zionist societies is the Hadassah Medical Organization.

This maintains four hospitals and a variety of hygienic establishments—polyclinics, a school medical service, advice and care for mothers and infants, a nursing school, laboratories: all transitional, to be taken over later by the Colony and the municipalities. The staff consists of 50 doctors. The Kupath Cholim is a Sick Fund (*Krankenkrasse*) created by a Jewish workers' organization, and maintained by the contributions of the members. Its doctors and officials work together without friction. It is concerned chiefly with the agricultural districts. Another important institution is the Pasteur Institute. Its functions are the preventive treatment of rabies, which is common, the production of vaccine lymph and bacteriological and serological work. Other institutions are described, such as the *Schaare Zedek* Hospital, where cases of typhus and relapsing fever are treated.

Of the diseases of Palestine the author tells us nothing that has not been already put on record.

**NEWSHOLME (Arthur). *Disease Records as an Indispensable Means of Disease Prevention.***—*Proc. Internat. Conference on Health Problems in Trop. America.* 1924. pp. 940-945. [United Fruit Company, Boston, Mass.]

In this communication the importance of statistics in disease prevention is emphasized. As the writer says, this subject forms a chief corner stone on which efforts for the prevention of disease are built. It was the statistics of the incidence of "fever" in England, in the early forties of the nineteenth century, which impelled the adoption of the important English sanitary reforms, and their sequential adoption in all quarters of the world.

Theoretically, it might be considered possible to reduce the incidence of a preventable disease in the absence of exact knowledge of its presence, its amount and its local distribution, but experience shows that such action, on the strength of scientific knowledge, apart from the pressure of a known evil, is seldom effective and continuous. The most efficient spur to action is the disagreeably obtrusive notification of each case of disease and its official record in reports published at short intervals.

In no instance has striking reduction of a disease been secured without knowledge of its general incidence, and it may be asserted generally, as an axiom in sanitary practice, that the pointer to prevention has always been the occurrence of disease.

In tropical regions difficulties in ascertaining the occurrence of disease are exceptionally great. There may be no complete registration of deaths and their causes; and except on plantations on which good organization prevails, including the provision of medical attendance for every employee, notification of cases of infectious diseases is likely to be very incomplete. The desiderata are:—

- (1) A statement of the population at risk, distributed according to sex, and if practicable in age groups.

- (2) A record of the number of births occurring in each locality, as without this a completely trustworthy statement of infant mortality cannot be made.

- (3) A record of the number of deaths, the cause of death, if possible, being medically certified.

By such means the main conditions of the healthfulness of a district or plantation may be gauged.

The above are, however, inadequate for satisfactory disease prevention; for this, it is essential that immediate notification of each case of preventable disease to a responsible medical officer be effected. Each notification is a pointer; it shows a possible centre of infection. Notification itself is of little use unless each case is regarded as the starting point of an epidemiological investigation with a view to the discovery of overlooked or concealed cases. This last implies field work, and *field work is the essential element in the practice of preventive medicine*. Accurate field enquiries must be undertaken, and action is never satisfactory which is not based on the correlated facts ascertained by the intelligent study of these field observations.

FISHER (V. M.). **Medical Arrangements for Native Labour on the Thika-Nyeri Railway Construction.**—*Kenya Med. Jl.* 1925. Jan. Vol. 1. No. 10. pp. 293-320. With 12 figs.

The monthly average of labourers employed during 1924 was 3,750, and in 1925 the figure was 2,000. The labour camps varied from 20 to 33 in number, and the population of each camp ranged from 50 to 800 persons. The larger camps were divided into sections, each separate from the other, in such a way that in no case were there more than 400 men in any one section. The camps were sited, built and maintained in accordance with the "Appendix to Specifications." The conditions were carefully and strictly enforced by inspections carried out frequently and regularly by the Railway Magistrate, and more occasionally by the medical officer.

The "Appendix to Specifications" includes the following:—

1. "Rations.—All African labour will receive:—

"Maize meal ... ..	2 lbs. daily.
"Meat ... ..	$\frac{1}{2}$ lb. daily.
"Chiroko or Beans ... ..	$\frac{1}{4}$ lb. daily.
"Ground Nuts ... ..	1 oz., or Ghee $\frac{1}{2}$ oz. daily.
"Fresh vegetables ... ..	1 lb. weekly.
"Salt ... ..	1 oz. weekly.

"('Fresh vegetables' includes bananas, sugar cane, potatoes, sweet potatoes, Muhogo or pumpkin)."

The above scale was worked out by the Medical Department, and though approved of by the Native Affairs Department and the Uganda Railway it was subsequently cancelled and an inadequate and lower scale was substituted.

The opinion is expressed that while no case of definite food deficiency occurred, yet it is probable that inadequate diet was one of the chief causes, or at least a contributing factor, of the disabling ulcers so frequent amongst the labour.

"Cooking pots and fuel will be supplied by the contractor, and one cook for every 20 men."

The system of cooks worked well.

2. "Water Supply.—The contractor will undertake that all his labour receives an adequate supply of water, both in camp and on the work. Labour must be prevented from fouling any water supply. Failure in this respect will necessitate water guards, the cost of which will be charged to the contractor."

There was at all times a supply of water that was satisfactory in quantity and quality. No case of fouling a water supply arose.

3. "Camps.—All camps must be sited by the Medical Officer. The site of the camp must be levelled, and all grass entirely removed,

over an area extending at least 30 feet from the outside row of huts. The type of hut *recommended* is that known as the 'kongoni,' as shown in the accompanying sketch. The approved dimensions of such a hut are : Length, 20 ft. along the side, excluding the rounded ends ; width, 16 ft. ; height, 14 ft. This will house 20 men. No other dimensions for a hut of this type will be approved.

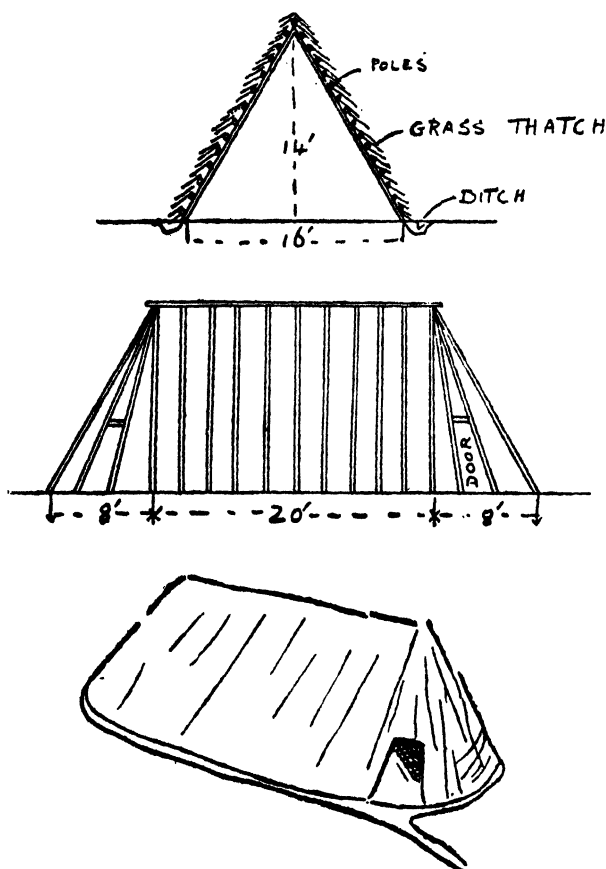


FIG. 35.—The "Kongoni" Hut recommended for use in native Labour Camps on the Thika-Nyeri Railway Construction, Kenya. This will house 20 men.

[Reproduced from the *Kenya Medical Journal*.]

" If round huts are built they should be 16 ft. in diameter with 4 ft. walls, and a roof at an angle of 60 degrees. Cubic space per man must be at least 150 cubic feet in grass-walled huts, 200 cubic feet in mud-walled huts.

" Any other type of housing accommodation must be approved by the Medical Officer before use.

" Huts must be at least 30 ft. apart.

" Not more than 400 men may be housed in one camp. If more labour is required to be housed in any area separate camps must be made at least 100 yards apart.

"Adequate drainage must be provided, and all camps must be kept in a thoroughly clean and sanitary condition. Refuse must be burned or buried.

"The contractor must appoint a person of authority who will be in definite charge of each camp, and responsible for all discipline, cleanliness, sanitation, and internal administration, and who can carry out all instructions issued to him on these matters by the railway or medical authorities."

The points requiring consideration in the selection of camp sites were those usually appertaining to the matter in a tropical climate; they do not need special mention. The "kongoni" type of hut was found satisfactory. Corrugated iron sheeting was used by one contractor on the understanding that one sheet was used for each man; as a rule the sheets were used for roofing, but on emergency could supply temporary shelter: it was found to be satisfactory.

4. "*Latrines*.—Latrines must be provided to the extent of 3 per cent. of the labour in camps to be occupied for one month or less, and 5 per cent. in other cases. They will be of the deep pit type, at least 10 ft. deep, with an opening 8 by 10 inches. In rocky ground, where deep pits are impossible, shallow trenches, or pans and incinerators may be used. The latrine must be enclosed by a fence at least 4 ft. high. No hut shall be situated more than 100 yds. from the nearest latrine. A proper path must be made from the huts to the latrine. The ground round the latrine must be cleared, and kept clear, of bush and grass. The contractor may be given help in supervising the construction and maintenance of the latrines, and sweepers will be supplied when necessary to keep them in a clean condition."

Latrines were the outstanding failure in camp organization, it being found impossible to make raw natives use them. Owing to lack of experience in their use, fouling round the hole at once occurred, with the result that each fresh comer moved further and further away. Gradually, the latrines became centres of masses of faeces spread radially around, till approach became almost impossible. Latrines continued to be insisted upon, but rather in the hope of educating the more intelligent of the labour than with the idea of their being of any great sanitary value.

The remaining matters with which the "Appendix to Specifications" deals do not require comment.

#### *Medical Arrangements.*

It was found in Kenya, that on railway construction  $1\frac{1}{2}$  per cent. of beds to the maximum of labour strength is sufficient accommodation to provide. Such scale of provision may need to be modified to meet local conditions; it is, however, a difficult thing to find out the comparative healthiness of a tract of country which is often more or less unknown before the advent of the railway. The location of hospitals and medical aid naturally depend upon local conditions of constructive railway work, and will be governed by such.

As regards hospital planning, the best type was considered to be the radial or some modification of it, owing to the economy in space required and ease of supervision.

The type of hospital wards, etc., may be seen from the illustrations reproduced below.

A standard ward is 30 by 16 by 14 ft. high, with a floor space of 480 sq. ft. and a cubic content of 4,000 c. ft.; it contains from 12 to 16 beds.

Of the diseases, the following were of greatest import: Pulmonary disease, including the pneumonias, influenza, bronchitis; diarrhoea and dysentery; fever, which in this construction consisted of about

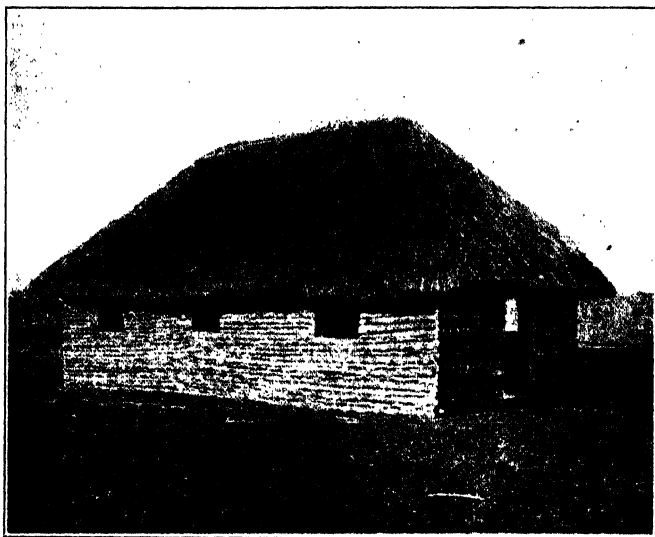


FIG. 36.—A Standard Hospital Ward used on the Thika-Nyeri Railway Construction, and allowing of 12 to 16 beds.

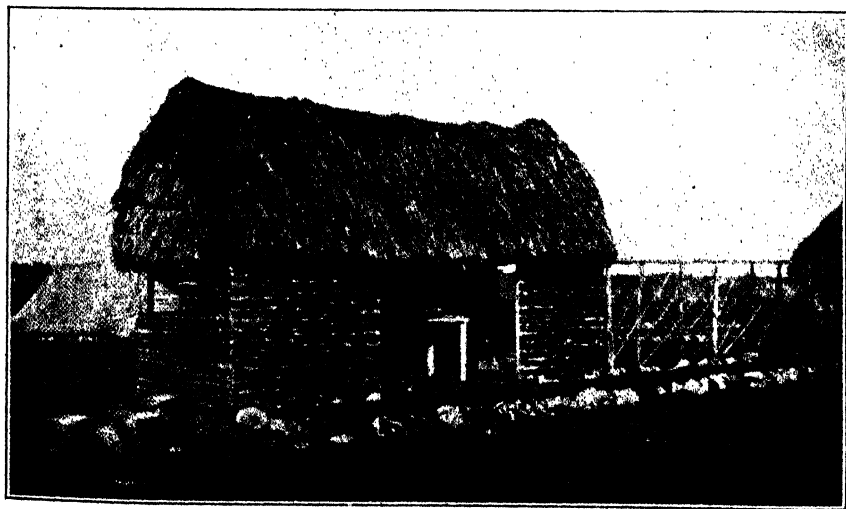


FIG. 37.—An Outpatient Dressing Hut used on the Thika-Nyeri Railway Construction. It measures 20 ft. by 8 ft. by 12 ft. high. The door is 10 ft. wide to admit a stretcher sideways, and the centre table is long enough for an unconscious patient or one with a broken leg.

Seats with foot rests are fitted at both ends of the hut.  
[Reproduced from the *Kenya Medical Journal*.]

90 per cent. subtertian malaria; and ulcer. These four groups together accounted for about 75 per cent. of all admissions. The average stay in hospital was as follows: Pulmonary disease, 6·93 days; diarrhoea and dysentery, 5·57; fever, 5·39; and ulcer, 21·8 days.

**TOMB (J. W.). A Note on the Outdoor Organisation of the Asansol Mines Board of Health.**—*Indian Med. Gaz.* 1925. Apr. Vol. 60. No. 4. pp. 156–160.

The Asansol Mines Board of Health, which is constituted under (Bengal) Act II of 1912, was brought into active existence by Government in the early part of 1916 to prevent “the outbreak and spread of dangerous epidemic disease” in the Asansol Mining Settlement. Within the Settlement are included 200 collieries, 490 villages, and 2 municipalities, the total population being, according to the Census of 1921, 329,353.

The chief epidemic diseases are cholera and smallpox, plague being unknown in epidemic form.

The unit of administration is the circle of the Sanitary Assistant, which is about 36 sq. miles in area. Thirteen Rural Sanitary Assistants are employed; their duties are:—

1. To collect the vital statistics of the circle from the village chowkidars (watchmen) at the weekly chowkidari parade held at the police station.
2. To verify these occurrences during the week.
3. To submit a weekly report on the sanitary condition of the villages visited and inspected while verifying the returns of births and deaths received from the chowkidars or otherwise.
4. To receive reports of outbreaks of cholera, smallpox or plague, and to take immediate steps for its repression.
5. To vaccinate during the first year of life all children born in the circle and all other persons found unvaccinated or requiring revaccinating.
6. To give lectures on elementary hygiene in the primary schools of the circle.
7. To make certain that the burning ghats (cremation places) are kept in good order by the staff maintained by the Board for that purpose.

All members of the outdoor staff are required to maintain bicycles, for the purchase of which money is lent free of interest by the Board, and each member receives a monthly bicycle allowance of Rs. 10.

Experience has shown that practically all deaths are reported in the Mining Settlement as checked by the number of bodies disposed of at the burning ghats. About 2 per cent. of births remain unreported.

A permanent register of corrected returns of births and deaths is kept by the Sanitary Assistant; one copy is sent each week to the office of the Mines Board for record, and another copy is sent to the police for forwarding to the office of the Civil Surgeon of the district. Weekly report is also made by the Sanitary Assistant to the Chief Sanitary Officer. This report gives information on the following:—Name of village. Date of visit. Object of visit. Whether or not

any epidemic was found. Number vaccinated. Water supply. Condition of burning ghat. General sanitary condition. A yearly report details the villages in the circle that are in the most urgent need of wells.

For the immediate reporting of cases of cholera and smallpox the chowkidars are provided with coloured postcards. For cholera a red card is used, the name of the village and of the chowkidar having been written in by the Sanitary Assistant when distributing the cards ; for smallpox a green card is provided. On receiving information of a case in the village the chowkidar at once starts off on foot to the office of the Sanitary Assistant, which in the Mining Settlement is in no instance more than six miles away. If the Sanitary Assistant happens to be out, the chowkidar places the card in a special glass-fronted box outside the office door where it cannot fail to be noticed.

In the case of smallpox no attempt is made to isolate the patient, as this is impracticable in rural health work in India. Reliance is placed wholly on wholesale vaccination and revaccination, a procedure which experience has proved to be eminently satisfactory. The Sanitary Assistant immediately reports all such cases to the Sanitary Inspector of his circle and to the office of the Mines Board of Health on a form having the following special headings : Date of onset of fever. Date of outbreak of eruption. Date of notification by chowkidar. Date of previous protection (if any).

In the case of cholera, if the patient is not already under medical treatment, the Sanitary Assistant prescribes 8 doses of an essential oils' cholera mixture (details of this are given in the *Indian Medical Gazette* of June, 1923, and May, 1924 ; see this *Bulletin*, Vol. 20, p. 737). One prophylactic dose of the same is given daily to each inmate of the infected house until the patient is clinically recovered ; actual attendants on the case receive two doses daily. Since this procedure was adopted three years ago no second case of cholera has occurred in any house in the Mining Settlement. Reports are made as detailed above under smallpox, the special heading in the case of cholera being : Date of notification of case by chowkidar. Date and hour of attack. Date and hour of arrival of Sanitary Assistant. Whether case was found collapsed or not. Treatment. Result.

Vaccination Registers are kept in bound volumes issued to the Sanitary Assistants, who enter therein all births and the subsequent vaccination of the children within one year of birth ; every effort is made to revaccinate young adults, especially girls before *pardah-nashin* age. Smallpox has been practically abolished from the Mining Settlement owing to vaccination efficiency, the death rate from the disease in 1922 being *nil*.

The Sanitary Assistant also gives weekly lectures in Bengali in the primary schools of his circle ; the subjects are : 1. The Importance of a Pure Drinking Water. 2. Cholera. 3. Typhoid Fever. 4. Dysentery. 5. Malaria. 6. The Importance of Quinine in the Prevention and Cure of Malaria. 7. Smallpox. 8. Plague. 9. Consumption. 10. Flies. 11. Hookworm disease. A primer (printed at the expense of the Board) is distributed free to all scholars ; periodical examinations are held ; and suitable book prizes are awarded annually.

There are six fully qualified Sanitary Inspectors who supervise the work of the Sanitary Assistants, each Inspector having as a rule two Sanitary Assistants under him. The collieries are in the sanitary charge of the Sanitary Inspectors who, in the case of epidemic disease



arising, take similar steps for the collieries as do the Sanitary Assistants for the villages. Lectures on public health are also given during the cold weather and in epidemic times by the Inspectors. The Board also employs an anti-malarial staff consisting of six selected Sanitary Assistants who have been specially trained in the necessary entomological methods. A staff of three midwives is maintained, who reside on collieries in different areas of the Settlement. For the medical inspection of school children a qualified Sub-Assistant Surgeon is employed.

The organization of the Mines Board of Health has been elaborated to meet the special requirements of the Mining Settlement. For ordinary district public health work a considerably less numerous staff would suffice, which could be maintained on a sum representing less than one anna per head of the population per annum.

As an illustration of the value of the work that can be accomplished by such an organisation the subjoined table, compiled from the weekly return of vital statistics in the *Calcutta Gazette* for 1923, is eloquent:—

DEATH RATES PER THOUSAND.

	Calcutta.	Howrah.	Dacca.	Maniktolla.	Asansol Mining Settlement.
Cholera ... ..	1.00	1.19	1.32	0.99	0.56
Smallpox ... ..	0.17	0.09	0.02	0.28	0.015
" Fever " ... ..	4.09	8.22	11.21	5.46	2.10
Diarrhoea and Dysentery	2.24	4.44	2.54	3.69	0.83
Respiratory diseases ...	8.91	6.47	2.98	10.24	3.75
Total ... ..	28.40	28.64	28.33	31.63	17.97

The Asansol Mining Settlement was once such a hot bed of disease as to necessitate for its sanitation the establishment of a special Board of Health, the population being annually decimated by a regular succession of epidemic diseases—cholera, smallpox and malaria, in the order named. All that is now changed, and the Settlement is probably, at present, the most salubrious area of its size in the plains of India, with a death rate which compares favourably with that of many countries in Europe.

**WATSON (Malcolm). Observations on Malaria Control, with Special Reference to the Assam Tea Gardens, and some Remarks on Mian Mir, Lahore Cantonment.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1924. Oct. 23. Vol. 18. No. 4. pp. 147–153. With 15 figs.

This paper, with fuller lantern demonstration than would perhaps be gathered from the printed word, emphasizes the necessity of ascertaining, first the anopheles implicated in conveying malaria in any particular area, and then the conditions essential for its larval development; so that such measures as tree cutting may not unwittingly be carried through in an area where the main transmitter abhors shade for its breeding places.

Of general applicability is the principle of deep subsoil drainage, the drain either open or buried, according as to whether, at the altitude

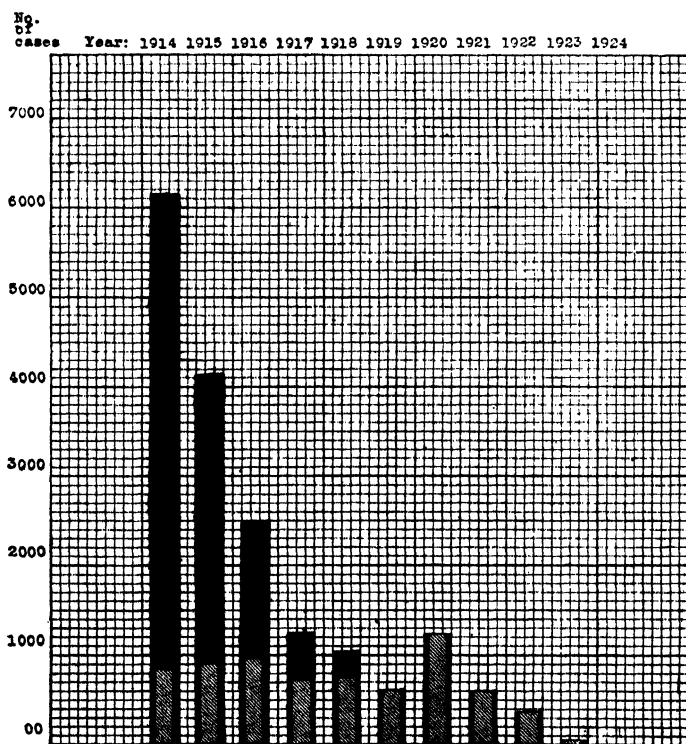
and in the circumstances generally, the former will not or will produce breeding places for locally dangerous species. The lantern slide illustrating the enormous potentiality of a centrifugal pump to get rid of water undrainable by gravity, was particularly striking. It was insisted upon that no method could be immediately effective unless it depended but little on education, and it was noted that the anopheline potentiality for long flight had not in practice been found to determine the extent of clearing requisite round coolie lines. This was settled by the actual discovery of infection as determined by the splenic index, and extended to about half a mile.

Clayton Lane.

WATSON (Malcolm). **Malaria in the Malay Peninsula.**—*Bull. Rubber Growers' Assoc.* 1925. Apr. Vol. 7. No. 4. pp. 229-234. With 2 charts in text.

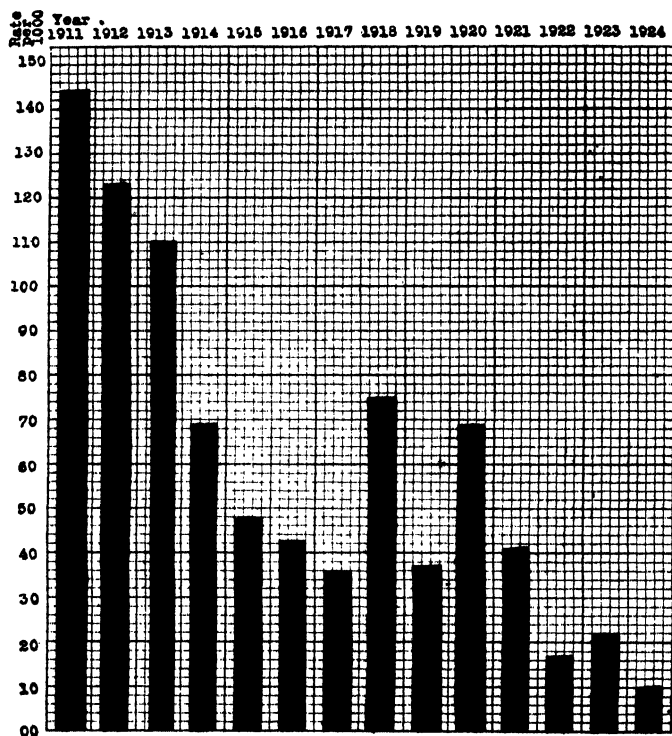
This communication is an account of the present condition as contrasted with the previous state of the Seafeld Estate. Fourteen years ago the Estate was one of the most intensely malarial places in

FIG. 38.—Chart showing elimination of Malaria from Seafeld Estates.



The black indicates all Malaria cases, whether treated as in- or out-patients. The scored spaces indicate in-patients only. (From 1919 no cases of malaria were treated as out-patients.)

FIG. 39.—Chart showing decline in Death Rates on Seafield Estate.



[Blocks kindly lent by the Rubber Growers' Association, and reproduced by permission of Mr. Norman W. GRIEVE, Chairman of the Seafield Rubber Company.]

the world ; to-day it is, if not absolutely free from the disease, certainly more free than the famous Panama Canal Zone, and as free as any part of the Malay Peninsula.

On the Estate malaria was carried by a mosquito which lived in the thousands of tiny springs and in the numerous streams of running water, and all methods hitherto applied had succeeded only in increasing the number of mosquitoes and in aggravating the severity of the disease.

The new method, that of sub-soil drainage, aimed at drying up the valleys with their springs and streams, so that no mosquito could find a breeding place. How this method has stood the test of tropical storms scouring down the narrow valleys is told in the statistics detailed.

To-day it is recorded that out of an average population of 719 for the year 1924 only 6 cases of clinical malaria occurred (parasites were found in the blood of none), and that in the years 1923 and 1924 only 1 child contracted the disease, though children are the most susceptible in the population.

The following statistical tables are of peculiar interest :—

## MALARIA CASES.

Year.	Average labour force	Number admitted to hospital.	Number treated as out-patients.	Total number treated.	Per cent. of labour force treated.
1914 ...	658	815	5,370	6,185	939
1915 ...	804	900	3,235	4,137	513
1916 ...	811	933	1,558	2,491	312
1917 ...	770	719	546	1,265	162
1918 ...	639	718	315	1,063	149
1919 ...	825	614	10	624	75
1920 ...	916	1,236	—	1,236	132
1921 ...	780	609	—	609	77
1922 ...	620	369	—	369	53
1923 ...	577	56	—	56	9
1924 ...	557	6	—	6	1·08

## SPLEEN RATES.

Year.	Old Seafield		New Seafield.	
	Number of children.	Percentage Rate.	Number of children.	Percentage Rate.
1905 ... ..	16	68	—	—
1906 ... ..	17	88	—	—
1909 ... ..	11	81	36	47
1914 ... ..	20	50	39	76
1915 ... ..	12	83	30	60
1916 ... ..	34	35	37	73
1917 ... ..	32	28	36	47
1918 ... ..	52	7	31	41
1920 (Jan.) ...	107	21	59	30
1921 (Feb.) ...	65	44	45	73
1922 (Feb.) ...	75	33	35	45
1923 (Jan.) ...	75	17	52	38
1923 (Dec.) ...	69	7	52	17
1925 (Jan.) ...	69	1	56	10

The anti-malarial work was begun on Old Seafield in 1911 and on New Seafield in 1914.

To-day all the children look well.

In 1923, 19 children were born, of whom 2 died.

In 1924, 23 children were born, of whom 2 died.

During 1923, 1 child contracted malaria, in 1924 not one.

No child has died of the disease for over two years.

DEATH RATE PER 1,000 OF WORKING LABOUR FORCE  
FROM ALL CAUSES.

Year.	Labour Force.	Death rate per 1,000.
1911 ... ..	520	144
1912 ... ..	427	123
1913 ... ..	552	110
1914 ... ..	658	69
1915 ... ..	804	48
1916 ... ..	811	43
1917 ... ..	770	36
1918 ... ..	693	75 (Influenza)
1919 ... ..	825	37
1920 ... ..	916	69
1921 ... ..	780	41
1922 ... ..	670	17
1923 ... ..	577	22
1924 ... ..	557	10·7

SENIOR-WHITE (Ronald). **The Eradication of Malaria from a Rubber Estate.**—*Indian Jl. Med. Res.* 1925. Jan. Vol. 12. No. 3. pp. 545–551. [3 refs.]

Oiling, following a survey which determined the breeding-places of *Anopheles maculatus* (this *Bulletin*, Vol. 19, p. 110), has been followed by a fall in malaria morbidity from 1,147 in 1919 to 6 in 1923. Much of the oil has been derived from the semi-solid residue which accumulates at the bottom of the tanks, where is stored the crude oil used for driving the factory engines. Direct centrifugal floatation revealed a hookworm percentage of 76·8, even after a hookworm campaign whose effect is not held to have had a share in effecting the drop in morbidity.

C. L.

WALRAVENS. **Prophylaxie de la malaria.**—*Revista Méd. de Angola.* (No. especial 1<sup>o</sup> Congresso de Med. Trop. da Africa Occidental. Vol. 3. 3<sup>a</sup>, 4<sup>a</sup> e 5<sup>a</sup> Sessões.) 1923. Aug. No. 4. pp. 405–411.

The work at Elizabethville (this *Bulletin*, vol. 21, p. 600) is further considered. It is felt unsound to rely upon suppression of breeding-places particularly favoured by the dangerous anopheline species, since the writer's experience has convinced him that these are readily satisfied with the next best thing. Flemish or Irish drains—ditches with a bed of branches or stones covered with earth—are advised for drainage, thus seemingly carrying out the principle of Malcolm WATSON's subsoil drainage. Holes in trees and defective municipal guttering form further instances where lay anti-malarial leagues have helped the sanitary service. Nevertheless, mosquitoes are very numerous and the problem has not been solved. Quinine prophylaxis was accordingly pushed, 0·4 gm. being given at 6 each evening, for it is held that those who take the dose in the morning are more prone to suffer from fever. In spite of this, in children under discipline to whom, relative to weight, quinine was given in this dosage, the results were unsatisfactory, so that it was resolved to try larger doses, 1·5 gms. (3 grs.) daily for children between 10 and 15, and note the result. Continued concentration on anti-malarial work is felt to be the most promising line to pursue.

C. L.

PRATES (Manuel M.) & BARRADAS (Antonio). **Sistematização no tratamento do sesonismo.**—*Revista Méd. de Angola.* (No. especial 1<sup>o</sup> Congresso de Med. Trop. da Africa Occidental. Vol. 3. 3<sup>a</sup>, 4<sup>a</sup> e 5<sup>a</sup> Sessões.) 1923. Aug. No. 4. pp. 393–404. [1 ref.]

Pointing out that one should not have to classify towns as tropical or non-tropical, but as sanitary or insanitary, the writers imagined a typical tropical town, and attempted to estimate the cost to it of malaria, as a financial basis for the expenditure justified in its elimination. They then passed on to consider the need for a standard treatment of malaria and urged the Congress to adopt an example which they suggested. The President (Dr. LEGER) pointed out that a dose of quinine which suffices to drive *P. vivax* from the cutaneous blood is quite insufficient to effect this for *P. falciparum*.

C. L.

MARCHOUX (E.). **La prophylaxie pratique du paludisme.**—*Bull. Soc. Path. Exot.* 1925. Jan. 14. Vol. 18. No. 1. pp. 40-44.

The very multiplicity of the possible lines of attack upon malaria is held disadvantageous. It would be better could one, thoroughly applied, be made to suffice. (1) Cost renders antilarval measures of restricted applicability. (2) Destruction of adult insects necessitates squads of persons, and screening is often more effective in keeping mosquitoes in than out, while nets need proper use. (3) Preventive quinine is taken regularly almost only under discipline. (4) Detection and treatment of the actually infected is advocated as giving the quickest and best results; but a large, devoted and costly staff is required. Economic amelioration of a country by right administration is held to be its most effective antimalarial measure.

C. L.

LEGENDRE (J.). **La prophylaxie actuelle de la malaria.**—*Presse Méd.* 1925. Feb. 4. Vol. 33. No. 10. pp. 155-156. With 4 figs.

Legendre points out the extent to which quinine prophylaxis has recently been discredited, but is yet held high by the French. He urges that this monoprophylaxis should in French colonies be more generally aided by what he calls physioprophyllaxis (screening) and agroprophylaxis (antilarval measures), among the latter urging the use of edible fish in flooded rice fields. For vicarious animal protection he holds that the most attractive beast varies with the locality, between rabbit, pig, cattle and horse, the last being preferable for Madagascar.

C. L.

COUVY (A.). **Note sur un essai de prophylaxie antipaludique à Madagascar.**—*Bull. Soc. Path. Exot.* 1925. Jan. 14. Vol. 18. No. 1. pp. 36-40. With 1 map in text.

Two districts in the Province of Itasy show a persistent excess of deaths over births, a large part of the former being attributed directly or indirectly to malaria. The malaria indices are very high. Extensive antilarval measures added to other antimalarial work has, in and about the town of Soavinandriana, been followed by a fall of mortality from 1,192 to 759, and has attracted interest far outside its actual confines.

C. L.

CARTER (H. R.). & LE PRINCE (J. A.). **Suggestions for the Control of Malaria on the Plantations of the United Fruit Company.**—*Proc. Internat. Conference on Health Problems in Trop. America.* 1924. pp. 165-168. [United Fruit Company, Boston, Mass.]

For economy, attention should be particularly directed to breeding-grounds of proved anopheline malaria carriers, those nearest to houses being first attacked. The hand killing of anopheles has proved very effective by boys of 13 to 16 years old—if they be paid by results. Two "Stickum Plates" (sheets of glass or celluloid covered on both sides with a mixture of resin and castor oil) set a few feet apart at right angles to one another will, by the number of mosquitoes which stick to each surface, indicate the direction from which these come, and point to their breeding places. The greater resistance of negroes to malaria is held to open up a wide virgin field for investigation.

C. L. :

PALESTINE. **Proceedings of the Tenth Meeting of the Antimalarial Advisory Commission, 20th November, 1924.** [HERON, (G.W.), Director of Health, President.] [MS. received from Dept. of Health, Jerusalem.]

BUXTON'S entomological report is appreciatively mentioned [this *Bulletin*, Vol. 21 p. 432]. The Commission has surveyed the Huleh plain including the Waters of Merom, covering 175 square kilometres and nowhere much exceeding 2 metres in depth. Those living about its bordering marshes, abundant springs and five feeding rivers have a parasite index of 50. The problem is to be dealt with by emptying the lake and turning its bed into irrigated cultivated land.

Dr. KOFE urged the administration of prophylactic quinine on the ground that small doses do no harm and tend to diminish the local number of infected anophelines.

While springs and seepage areas are satisfactorily dealt with by collection into a bifurcate drain run alternately each 5 or 6 days into 2 separate fields, the care of the wadis in the plains, with their tremendous winter washouts, is a difficult matter, and one now obtaining official investigation. Other new projects are under consideration, and the value of the work accomplished is amply demonstrated.

C. L.

LE PRINCE (J. A.). **Can we get Better Anopheles-Control and More Malaria-Control at Less Cost?**—*Proc. Internat. Conference on Health Problems in Trop. America*. 1924. pp. 157-161. [United Fruit Company, Boston, Mass.]

The writer remarks that the state of malaria-control that should be obtained is not achieved, because of the failure in making the public desire it and work for that end. He points out that in the United States the public pays the screen manufacturers about 25 million dollars yearly for mosquito screen-wire, but that the protection afforded is only partial. Too many buildings that are screened are either not effectively protected or else the screening is not effectively maintained. After a building is screened, it should be inspected for places through which anophelines can enter, and any defects made good. All screened buildings should be inspected at definite, short intervals, and anything needing repair should be noted.

Even in unscreened buildings, the gorged anophelines can be easily killed with a fly-swatter when resting during the daytime. By this means nearly all the potentially-infected anophelines could be killed even in the houses of the poorest classes.

Mosquito traps as used in the Panama Zone proved effective in anopheline elimination. It is suggested that suitable, dark, tranquil, daytime resting places might be created and treated with tangle-foot compounds, so that potentially infected mosquitoes may destroy themselves in large numbers.

Trap pools, or artificial breeding-places, are advocated; these could be kept under control and treated as often as necessary.

Top minnows and other suitable fish are not used as much as they should be. Favourable mention is made of Paris green as a larvicide.

In carrying out anti-malarial work the non-essentials should be avoided, but effort should be concentrated on all proved and recognized methods against the anopheline.

KLIGLER (I. J.) & SHAPIRO (J. M.). **Organisation of Areas for Mosquito Control in Palestine.**—*Harefuah*. Jerusalem. 1925. Apr. Vol. 1. No. 4-5. English summary pp. v-vi. [In Yiddish pp. 180-188. With 35 charts and tables on 2 folding sheets.] [5 refs.]

Nine districts were dealt with in various parts of the country, comprising a population of 13,580 Jews and 7,650 Arabs. Greatest emphasis was laid on anti-mosquito work, treatment of carriers being a subsidiary measure. Quinine prophylaxis was not used.

In reservoirs in the orange groves the fish Petach Tikwah (*Tilapia*) was used with great success. Erosion pools in wadis were cleaned and oiled. Springs were dammed and the water released at intervals. Irrigation and mill channels were closed for 24-28 hours, until they and the swamps caused by them were dry.

The following were the most useful larvicides: Kerosene mixed with crude oil in the proportion of 9 to 1 to which 1-2 per cent. castor oil was added; this was used when the air was calm. Paris green was found excellent in overgrown swamps or wadis. Cresol (1-10,000 as the final concentration) was useful in gravel swamps and pools.

Benign tertian predominates during the spring and summer, malignant tertian almost exclusively only during September to December, the peak being in October. The only districts in which no progress was made was in the areas of coastal marshes, which are difficult to control. The *per capita* cost worked out at as low or lower than that of similar operations in the United States of America.

- i. BERNARD (Léon) & MARCHOUX. **La lutte contre le paludisme et l'organisation sanitaire en Italie.**—*Bull. Acad. Méd.* 1924. Dec. 16. Year 88. 3rd Ser. Vol. 92. No. 42. pp. 1453-1461, and *Rev. d'Hygiène*. 1925. Feb. Vol. 47. No. 2. pp. 101-108.
- ii. RAYNAUD (Lucien). **La malaria en Italie: lutte antipaludique; ses procédés; ses résultats.**—*Presse Méd.* 1924. Nov. 19. Vol. 32. No. 93. (Supplément) pp. 1951-1953.

i. Regarding the Inquiry by the League of Nations (this *Bulletin*, Vol. 22, p. 39), it is here noted that the sale of State quinine has, since 1902, resulted in a profit of 24 million lira, of which 17 millions have been spent on antimalarial measures.

ii. The results of scientific control of antimalarial work in Italy lead to the urgent recommendation that similar co-ordination is essential for Corsica.

C. L.

BOTE (George S.). **Drainage Ditches covered economically. Concrete Pipe manufactured and laid cheaply in Emporia, Va.**—*Public Health Rep.* 1925. Mar. 13. Vol. 40. No. 11. pp. 502-509. With 3 figs on 1 plate.

Approximately nine miles of open ditching have been completed and placed under mosquito control. In that part of Virginia in question the top soil is loam and the next lower stratum is gravel or blue clay. The banks of the ditches have gradually caved in and the bottoms have widened. The maintenance cost of the ditches has



progressively increased, in some places fences on property lines have fallen, and the oil-soaked mud thrown out in the cleaning processes resulted in unsightly accumulations.

For several years attempts have been made to find an inexpensive method of piping or covering the ditches, but it was not until 1924 that a practical and economical plan was evolved.

A 30-inch pipe was needed for the ditches that it was proposed to cover first, and it was found that if terra-cotta piping was purchased

MAKING CONCRETE PIPES IN EMPORIA, VA., FOR DRAINAGE DITCHES.



FIG. 40.—Filling metal moulds with concrete. Each mould has one inside casing, one outside casing, one cone centering plate, one top socket ring and one bottom socket ring. If an extra bottom socket ring for each mould is provided, a mould filled with concrete one day can be removed and refilled on the following day without moving or handling the pipe poured the first day.



FIG. 41.—Concrete pipes ready to be laid.



FIG. 42.—Pipe in ditch.

[Reproduced from the *Public Health Reports*, Washington.]

the cost of provision and laying would amount to 4.57 dollars per foot. Such expense could not be supported, and other expedients were examined. The plan finally decided upon was to purchase metal moulds and to make the piping of concrete locally. The necessary mouldings for the making of 30 in. pipes were obtained at a cost of 56 dollars per section, that for a 24-in. pipe amounting to 42 dollars.

The metal moulds were set on a concrete platform about 6 ft. square ; it is important to have them set level in order to get smooth and even ends to the piping, so that jointing may be satisfactory. The concrete was mixed by hand and consisted of 1 part Portland cement,  $1\frac{1}{2}$  parts sand and  $2\frac{1}{2}$  parts gravel or crushed stone. Gravel should not exceed  $\frac{1}{2}$  inch in size. Each pipe is reinforced with 6 rings of No. 9 wire, the rings being placed as the moulds are filled and spaced as equally as possible.

As compared with the price detailed above for 30-in. piping purchased in the ordinary market, the cost per foot of the locally manufactured piping was reduced to 73 cents per foot or less.

The writer concludes that the advantages are as follows :—

- “(1) Small outlay for equipment.
- “(2) Pipe can be made at odd times, as much or as little as funds will permit.
- “(3) Practically no overhead when moulds are not in use.
- “(4) Low cost of manufacture, with resulting greater accomplishment in proportion to expenditure.
- “(5) Equipment always on hand to manufacture pipe when needed.”

The method is stated to have worked exceedingly well.

PUBLIC HEALTH REPORTS. 1925. Jan. 30. Vol. 40. No. 5. p. 215.

—**Mosquito Breeding in Water Barrels. Instructive Incident in Campaign against Mosquitoes at a Naval Operating Base.**

Owing to negligence in oiling two barrels of water kept for fire purposes thousands of *Culex* mosquitoes were bred out and distributed

over the naval base. Every available body of water was stocked by the insects, and owing to frequent rain many breeding places existed. Although nearly four tons of nitre cake and 150 gallons of crude oil were used during September, 1924, thousands of mosquitoes still remained. No anophelines were found.

GREEN (Howard Whipple). **The Theory of the Use of Oil for Destroying Mosquito Larvae.**—*Amer. Jl. Public Health.* 1925. Mar. Vol. 15. No. 3. pp. 219-222. [1 ref.]

The results of experiments undertaken in 1921 and 1922 to determine what properties of oils were active in killing mosquito larvae may be outlined as follows (full-grown *A. albimanus* larvae were used in all the experiments unless otherwise stated):—

I. The oil film causes full-grown anopheles larvae to die :

- (a) By suffocation due to a mechanical barrier being formed between them and the air. Larvae live the same length of time (22 minutes) when prevented from reaching the outside air by physical means as by a film of non-toxic oil such as Nujol.
- (b) By suffocation due to the oil entering their breathing siphons to an extent sufficient to physically block the passage of air. Larvae die in the same length of time after being exposed to a film of Nujol for 53 seconds as when exposed for 22 minutes. The heavy oils do not enter the siphon to any extent and therefore a short exposure has no effect upon the larvae.
- (c) By poisoning due to the toxic properties of the volatile portions of the oil penetrating the tracheal tissues. Gasoline causes death in 12 seconds, kerosene in 4 minutes. The volatile portion of the oil alone causes death in the case of gasoline in 7 minutes, and kerosene in 2 hours.

II. The rapidity with which the larvae die is dependent upon the volatility and toxicity of the oil.

Larvae obtaining large quantities of this toxic substance die in much shorter time than those obtaining small quantities.

III. Larvae obtain their fatal dose in a very short time.

- (a) Larvae obtain their fatal dose of gasoline in less than one second, and of engine distillate (Texaco) in less than two seconds.
- (b) Larvae do not obtain a fatal dose of oils so heavy that they do not enter their breathing siphons.

IV. *Culex* larvae require at least 6 to 8 times as long to die as do *Anopheline* larvae.

The method used to apply the oil is nearly as important as the oil itself.

One method is to cover the surface of a body of standing water with a large quantity of heavy non-toxic oil which, provided the entire surface is continuously covered, will after several hours kill all the larvae. It will also prevent egg laying and will kill any female mosquito attempting to oviposit. A large quantity of oil of good spreading power and slow evaporation is necessary. This method is not suitable for running water or for waters exposed to much wind action.

A preferable method is to cover the entire surface with a very thin film of a toxic oil which will kill the larvae rapidly and may then evaporate completely. Eggs will be deposited again on the water surface, and

it is necessary to oil a short time before the new-brood is ready to hatch out. Owing to differences in surface tension, oil placed in the centre of a water surface does not cover completely, the film does not reach the banks or flow into pockets at the sides of streams. In order to overcome this difficulty instructions are issued to "paint" both sides of all ditches with oil. Applied in this way the edges are treated and, moreover, the oil will spread to the centre in addition.

The oil is best applied by spray cans, of which there are two general types: The Myers knapsack spray pump, Panama type, fitted with a Bordeaux nozzle, and the Pneumatic Compressed Air Sprayer. The disadvantages of the knapsack sprayer are considered to be:—

1. The capacity of 5 gallons of oil makes a heavy load.
2. Being carried on the back renders it difficult to manage in rough country where climbing fences and mounting other obstacles is necessary.
3. Spillage of oil is liable to occur on to the back of the oiler. This results in damage to clothing and sometimes in injury to the skin.
4. Owing to the weight there is a tendency for the oiler to use more oil than is necessary in the first part of his trip, in order to lighten the burden.

Otherwise, this sprayer is well-constructed, easily cleaned and capable of standing hard usage.

Several types of Pneumatic Compressed Air Spray tanks and nozzles were tested. It was found that the Myers Compressed Air Spray tank, fitted with a 2½ ft. extension and a graduating vermored nozzle, gave the best satisfaction and was most economical. The capacity of the tank is three gallons, and it is carried in the hand or suspended from one shoulder. The oil cannot be spilled, and is put under pressure by manipulating a pump handle, which operation must be repeated frequently. The oil is released only when the hand firmly grasps the spring valve. The extension piece allows of the oil being placed exactly where required regardless of the velocity of the wind. Without the extension piece, or with a short extension, much of the highly volatile and toxic portion of the oil never reaches the water surface in the ditch. With a suitable extension piece the portion of oil most active in killing the larvae reaches the water surface and is not blown away, as so frequently happens when the spray passes through the air for a number of feet.

**CURRY (Dalferes P.). Some Observations on Mosquito Control in the Canal Zone, with Especial Reference to the Genus Anopheles.—**  
*Amer. Jl. Trop. Med.* 1925. Jan. Vol. 5. No. 1. pp. 1-16.  
[10 refs.]

The diseases known to be commonly carried by mosquitoes are yellow fever, dengue, filariasis and malaria.

The first of these, it is believed, need no longer be dreaded; yellow fever is not known to be prevalent in any country with which the Canal has contact sufficiently intimate to favour its importation. It is not stated that the Canal Zone is entirely free of *Aedes aegypti*, but CONNOR and HANSON, as well as others, have conclusively shown that it is not necessary to aim at absolute extermination of the last *aegypti* in order to break the chain of infection. Owing to the piped water supply of the Canal Zone and the adjacent cities of Panama and

Colon there should never occur, even without the watchfulness now maintained, an *Aedes aegypti* population sufficient to render the community infectible to yellow fever.

Dengue, also conveyed by *A. aegypti* and *Culex quinquefasciatus*, does not appear to thrive on the Canal Zone, or else its spread is limited by the same factors that limit yellow fever.

Filariasis is not a disease of much concern. Though present amongst the Porto Rican soldiers stationed on the Isthmus, it is apparently not as easily contracted as some of the other mosquito-borne diseases and there is no experience of its spread in the Zone. It is said to be conveyed by *C. quinquefasciatus*, and possibly by *A. albimanus*, as well as by other mosquitoes which do not occur in the Zone.

The control of malaria is quite another question. The following table shows the admission rate per 1,000 employees for the years specified:—

Year.	Average number of employees.	Rate.	Year.	Average number of employees.	Rate.
1904 ...	6,213	125	1914 ...	44,329	82
1905 ...	16,511	514	1915 ...	34,785	51
1906 ...	26,547	821	1916 ...	33,176	16
1907 ...	39,238	424	1917 ...	32,589	14
1908 ...	43,890	282	1918 ...	25,520	18
1909 ...	47,167	215	1919 ...	24,204	31
1910 ...	50,802	187	1920 ...	20,673	19
1911 ...	48,876	184	1921 ...	14,389	15
1912 ...	50,893	110	1922 ...	10,447	17
1913 ...	56,654	76	1923 ...	10,976	19

General GORGAS, writing in 1909, says:—

"Our antimalarial measures consist:—

"1. In destroying the habitat of the anopheles during the larval stage within a hundred yards of dwellings.

"2. Destroying within the same area all protection for the adult mosquito.

"3. Screening all habitations so that the mosquito cannot have access.

"4. Where breeding places cannot be done away with by draining, use is made of crude oil, Phinotas oil and sulphate of copper for the destruction of larvae."

The above was done at a cost of "only five hundred thousand on purely sanitation," i.e., exclusive of the cost of the care of lepers, of the insane, of street cleaning, garbage collecting, etc.

In comparison the activities of the work to-day are:—

1. Destroying the *anopheles* (and all other mosquitoes) during the larval stage within *one mile* of the more important residential and industrial centres; large breeding areas of anopheles of the more dangerous species are controlled by ditching up to the distance of two miles, if the necessity for so doing is indicated.

2. Practically no attention is paid to "harbouring places" that afford protection to adult mosquitoes; the money is spent on the control of breeding.

3. Screening of habitations is insisted upon with the same thoroughness as in previous years. In some of the smaller and less important places where no anti-larval work is done, screens are the only means employed against mosquitoes.

4. Larvicides of various kinds have been employed from time to time, but now only crude petroleum of high viscosity (the fuel oil of local commerce) is used, with results that are satisfactory from the point of economy and efficiency. Breeding-places have been done away with by open ditching, subsoil rock and tile drains, and by filling, so that gallons of oil suffice where formerly barrels were required. Improved methods of applying oil have achieved much of this saving.

The above have been carried out at a cost of 60,000 dollars a year for the past two years.

It must be stated, however, that, geographically, the present-day situation is very different to that of the first 10 years of American sanitation. In the latter period much engineering work was going on which necessarily destroyed anti-malarial work possibly just completed, and, moreover, created fresh troubles for the sanitarian. Nowadays, there are considerable areas in which anti-malarial measures are no longer required; much of the ground formerly under control has been inundated by the formation of Gatun Lake; employees have been grouped in fewer places; and the Army maintains its own sanitary supervision about the posts outside the terminal cities.

It is only during the past few years that recognition of the long flight of *A. albimanus* has necessitated the extension of anti-malaria work to a distance of at least two miles from protected centres. It is probable that operations will be yet further extended in some of the more prolific breeding areas on the Atlantic side of the Isthmus.

Of the 11 species of *Aedes* present only two are common or troublesome. *A. aegypti* breeds only within or very near to human habitations in artificial containers. *A. taeniorhynchus* is a fiercely biting, striped, black mosquito which invades the Zone from tidal swamps at a distance said even to exceed 40 miles away; its presence in large numbers is usually of but brief duration in the early weeks of the rainy season.

Of the 39 species of *Culex*, only one is commonly troublesome to man—*C. quinquefasciatus*, the fairly large, banded, brown mosquito with breeding habits somewhat similar to *A. aegypti*, except that it has a wider choice of breeding-places and prefers waters that are foul, as in cess-pools, sewers and gutters.

Of the four *Mansonia* present, one at least is a long-flying and bloodthirsty pest, but its breeding range is limited to the quiet water of lakes and rivers where *Pistia* (water cabbage) flourishes.

The Anopheles are naturally the most important genus for consideration. Dr. DYAR lists nine of these: *Anopheles albimanus* Wied., *A. tarsimaculata* Goeldi (Mr. ZETEK considers this only a variety of *albimanus*), *A. argyritarsis* Rob.-Des., *A. neivai* H. D. and K., *A. punctimacula* D. and K., *A. apicimacula* D. and K., *A. eiseni* Coq., *A. pseudopunctipennis*, Theob., and *A. nimba* Theob. Mr. ZETEK reports another, *A. hylephilus* D. and K., which Dr. Dyar does not now include or mention in the synonymy of his species.

All the authorities are in agreement that the *albimanus-tarsimaculata* group is greatest in importance. They fly farther, more persistently seek entrance to houses to feed on human blood, and have a higher rate of infectibility with plasmodia than any of the others. While they have a fairly general distribution of breeding-places in the wet season, it has been recently observed by the author that they are practically the only anopheles which breed to any great degree in the brackish, partly tidal swamps of the Atlantic side of the Isthmus, which

are covered with vegetation and are shallow. The creation of Gatun and Miraflores lakes, the first of 165 sq. miles, and the other of 3 sq. miles, has greatly increased the areas most favourable for *albimanus* breeding, and these lie within the economically imposed limit of two miles from important industrial and residential centres.

*A. pseudopunctipennis* is also common and widely distributed, but is limited in breeding to the smaller streams and ditches and isolated pools, usually where sunlight has free access and algae are plentiful. This species does not fly so far as the preceding group, and does not so commonly invade habitations. DARLING found it to be far less capable of infection with malaria than *albimanus*. The species, while possibly of importance when breeding close to habitations, need not be considered a menace when breeding at a distance, and it is considered that half-a-mile, or even less, could be safely the limit of effort at control.

*A. argyritarsis* may also be experimentally infected with malaria, but it closely shares the characteristics of *pseudopunctipennis* as a menace. It is not considered a grave factor in the malaria incidence in the Canal Zone.

*A. punctimacula* and *A. apicimacula* are so similar in habits and characteristics that they may be considered as one from the sanitary point of view. They usually breed in sheltered or grassy pools of clear clean water and do not generally invade houses or fly great distances. It is probably safe to ignore both of these species as factors in malaria production.

*A. eiseni* has, as breeding places, the scant water held between the sheaths and leaves of plants, and clear clean water in rock pools, especially if under shade. Nothing is known of its malaria-carrying powers.

*A. neivai*, *A. nimba*, and *A. hylephilus* breed only in the water held by certain plants and are extremely rare.

The opinion is expressed that *A. albimanus* and the variety *tarsimaculata* alone merit extensive and expensive anti-malarial work in the Canal Zone. Were this species not present, the malaria problem would probably dwindle to insignificant proportions.

BOYD (J. E. M.). **Some Further Notes on Cresol as a Larvicide.**—*Jl. Roy. Army Med. Corps.* 1925. Apr. Vol. 44. No. 4. pp. 285-287.

As a result of trials of Cresol as a larvicide at several stations in India, the opinion is expressed that no solution of less strength than 1 in 100,000 will prove of use.

PUBLIC HEALTH REPORTS. 1925. Jan. 9. Vol. 40. No. 2. pp. 51-54. **The Present Pandemic of Plague.**

The present pandemic of plague began in China in 1894. In 1896 India, Japan, Asiatic Turkey, and European Russia were infected. In 1898 the disease spread to Madagascar and Mauritius, and in 1899 it appeared in Arabia, Persia, the Straits Settlements, Austria, Portugal, British South Africa, Egypt, the French Ivory Coast, and Portuguese Africa. About the same time plague appeared in Argentina, Brazil, Paraguay, and the Hawaiian Islands, and in 1900 the disease appeared for the first time in the United States, in California, at San Francisco. In addition to its having appeared in other South American countries since 1900, the disease reached Seattle in 1907, in 1914 it appeared in New Orleans, in 1920 in Beaumont and Galveston, Tex.

During the calendar year 1923 plague was reported as being present in the following countries : Algeria, Australia, Azores, Brazil, British East Africa, Canary Islands, Ceylon, Chili, China, Ecuador, Egypt, France, Greece, Hawaii, India, Indo-China, Iraq, Japan, Java, Madagascar, Mauritius, Mexico, Morocco, Palestine, Peru, Portugal, Portuguese West Africa, Russia, Siam, Siberia, Spain, Straits Settlements, Syria, Tunis, Turkey, Union of South Africa, and Venezuela.

Some of these countries have been plague-infected for many years and no doubt will remain so for many years to come.

MITCHELL (J. Alexander). **Plague. Its Control, Eradication, and Prevention.**—*Med. Jl. S. Africa.* 1925. Mar. Vol. 20. No. 8. pp. 235–238. (Annexures A, B, and C. pp. 238–240.)

This is a valuable memorandum primarily intended for the information and guidance of Local Authorities, District Surgeons and Medical Officers of Health of rural areas ; much of it, however, is applicable to urban areas.

The memorandum is somewhat long to give in detail here. It will without doubt repay perusal by all concerned with the prevention of plague. For the purpose of the *Bulletin* it will suffice to mention the various headings under which information and instruction is detailed.

In the note on equipment stress is laid on the necessity of being prepared for emergencies. Local authorities should provide in advance such equipment as will enable a few cases of the disease, or of suspects, to be isolated, and the necessary disinfections to be carried out.

The need for accurate diagnosis is next emphasized and attention is directed to pamphlets issued by the Health Department of the Union with that object. The prevalence of rodents in dwellings, out-buildings, or on the veldt, and any evidence of suspicious sickness or mortality amongst them, is mentioned.

The taking of specimens and materials is next dealt with. Full directions are given as to containers, methods for the proper collection of specimens from : (1) Suspected cases with inflamed glandular swellings, not discharging ; (2) suspected pneumonic or " Bubopneumonic " cases ; (3) suspected septicaemic cases. Details are given as regards the taking of material at post-mortem examinations.

The labelling, packing and forwarding of specimens are fully dealt with, and the precautions necessary when making post-mortem examinations are mentioned.

Clear instructions are given as regards the reporting of plague cases and of outbreaks, and the measures for dealing with the latter are comprehensive and definite.

Remarks follow as to plague amongst rodents, and preventive methods for towns, dwellings, and for rural areas, are detailed.

In the conclusion of the memorandum the risks of conveyance of infection by rail, etc., are brought to notice.

The three annexures are as follows :—

*Annexure A* contains an abstract of regulations under the Public Health Act concerning Plague. Particulars are given regarding : (1) The reporting of deaths or illness, or rodent mortality ; (2) isolation, quarantining and disinfection ; (3) preventive measures ; (4) rodent-proofing of buildings in urban areas ; (5) storage of grain, forage, etc., on farms and in towns.



*Annexure B* deals with liquid disinfectants and insecticides, and provides information as to their use in connection with plague. Details of the following are given: Naphthalene oil, perchloride of mercury, formalin, the coal tar derivatives, and solution of chloride of lime.

*Annexure C* provides information on fumigation and gassing methods (for rodents and fleas) in connection with plague. Details on the use of the following are supplied: Capex mole and vermin destroyer cartridges, agricultural dynamite, carbon bisulphide, hydrocyanic acid, formalin gas, and sulphuric acid gas.

The memorandum and the annexures form a most useful and helpful guide to the prevention of plague, and without doubt are a valuable assistance to those engaged in this matter.

WHITE (Charles F.). **Rat-Guards for Ships' Hawesers.**—*Lancet*. 1925. Mar. 28. pp. 695-696. With 1 text fig.

A new design of rat-guard is described, for which the following advantages are claimed:—

(1) *Ease of Application.*—The guard is easily and rapidly applied to one, two, or three ropes, and needs no binding in position.

(2) *Maintenance of Position.*—Under trying circumstances of wind and alternate tightening and slackening of ropes the guard has maintained its position vertical to the rope for a week's test without any adjustment whatever.

(3) *Rigidity.*—Except for the door opening, the guard is one continuous sheet of metal, and is therefore very much stronger than the old type. The riveting of the collar to the disc adds greatly to the stability of the guard, while the steel spring resists the bursting strain when two or three ropes alternately slacken and tighten with the movement of the ship.

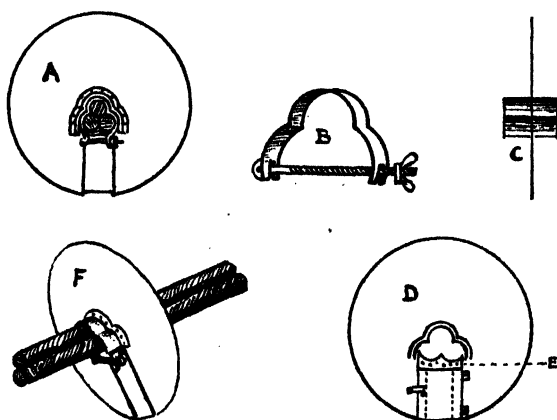


FIG. 43.—A. Front view of rat-guard showing three ropes clamped by steel spring. Outside the spring is the collar and below the door, shut and providing no foothold for rats. B. Steel spring for three-rope guard with screw clamp. C. Side view of guard showing projection of collar on each side. D. Reverse side of disc showing hinges and fastening of door. E. Sheet rubber fitting on top of door. F. Guard fixed on mooring-ropes.

[Reproduced by permission from the *Lancet*.]

The guard consists of a disc of galvanised sheet iron  $\frac{1}{8}$  inch thick and 3 ft. in diameter. The edges are left raw, *i.e.*, not wired or turned over. In the lower half is cut a door, hinged and so fastened when shut that no foothold is afforded to rats. The door slit leads to the central hole through which the rope passes. Round the central hole is placed a strong collar projecting about 4 in. on each side, and riveted to the disc. In the collar is a strong steel spring clip which can be tightened by the winged nut on the bolt (fig. *b*). In application the door is opened and the guard put over the rope so that the latter passes up into the central hole, where a little force is necessary to overcome the spring of the clip. The guard will now hold quite firmly, but the bolt and screw closing the opening of the clip gives additional security. The door is then closed and fastened, the upper edge having a piece of thick sheet-rubber attached so as to close completely the central hole, whatever the size of the rope in use. In the sketch a type of guard suitable for three ropes is shown, such being frequently necessary for large ships. Types are also made for two ropes, one rope or two or three wires, and any guard will fit ropes over a range of about 3 in. difference in diameter, so that any ship may easily be supplied with a set of guards suitable to her requirements.

The guards cost a few shillings more than the usual pattern, but this should be repaid in longer life and greater efficiency. Messrs. Fred. Moore and Company, 46-48, Park Lane, Liverpool, are the manufacturers.

PUBLIC HEALTH REPORTS. 1925. Mar. 6. Vol. 40. No. 10. pp. 451-455. With 4 figs. on 2 plates.—**Rat-Extermination Measures employed at Liverpool, England.**

The information is taken from a recent report on the subject made by the American consul at Liverpool.

The following is given as the personnel engaged :—

<i>For the City.</i>	<i>For the Port.</i>
1 assistant officer of public health.	1 assistant officer of public health.
1 chief inspector.	1 chief inspector.
1 departmental chief inspector.	1 departmental chief inspector.
33 inspectors.	5 qualified sanitary inspectors.
8 rat catchers.	7 rat catchers.
	3 rat searchers.

For rat-suppressive measures the City is divided into three zones :—

Zone 1.—Ships in port.

Zone 2.—(a) Docks.

(b) Neighbouring warehouse districts.

Zone 3.—Remainder of the City.

Zones 1 and 2 are dealt with by the port sanitary authorities, and Zone 3 comes under the City sanitary authorities. The two bodies are entirely separate units and are responsible to the Medical Officer of Health.

*The City.*—This is divided into 30 districts each in the charge of an inspector. Three inspectors are used for special and relief work.

The operations of the rat-catchers are governed by the reports of the inspectors; they are not assigned to any particular district, but are utilized where most required.

*The Port.*—The objects constantly in view are :—

- (1) Early detection of plague-infected rats.
- (2) Prevention of spread of infection when found.
- (3) Reduction in the number of rats on ships and wharves, from the point of view of both plague-prevention and for economic reasons.

All rats caught are examined bacteriologically to detect plague infection.

In addition to their ordinary work of general port sanitation the inspectors obtain particulars as to rat infestation of all ships entering port, and whether any sick or dead rats were reported during the voyage.

The rat searchers devote their time to the searching of ships and wharves for sick or dead rats and for indications as to whether fumigation is necessary. Special attention is paid to arrivals from infected ports. When not engaged on ships the searchers work systematically over the dock areas.

Of the 7 rat-catchers, 3 are employed on ships, and 4 on the wharves; their work is guided by reports of the sanitary inspectors and rat searchers. Concentration on any suspected area is arranged and extensive rat-extermination instituted when indicated. All rats caught and all sick or dead rats found are examined bacteriologically; accurate records are kept so that the locality from which any particular rats have come can be immediately determined.

The methods of rat-destruction generally employed are, trapping, poisoning and fumigation. Poisoning is not employed to a great extent, as it is considered a rule to regard with suspicion all rats found dead, until the absence of plague infection is proved. Circular metal rat-guards, 3 ft. in diameter, are used on mooring ropes of vessels; some difficulty has been experienced in keeping these in position. One steamship line employs a man whose whole time is occupied in keeping the guards of their ships properly adjusted.

Fumigation of ships is carried out as follows :—

- (a) On suspicion of plague infection among the rats on board.
- (b) To comply with the requirements of certain foreign governments who demand a certificate of fumigation.
- (c) When investigation by rat searchers and rat-catchers indicate that the vessel is infested.

Sulphur dioxide gas is used, being generated in iron pots standing in water. Cylinders of liquid  $\text{SO}_2$  are used in oil-burning vessels.

If plague-infected rats are found upon a vessel entering port; the following precautions are immediately taken :—

The vessel is breasted 6ft. from the wharf. Rat guards are placed on mooring ropes. The gang-way is whitewashed and hoisted when the vessel is not working: when in use a guard is stationed at each end. Concentration of the entire staff may be made in the search of the vessel and its cargo for rats, additional labour is engaged if necessary. Information concerning the crew is obtained and any members absent owing to sickness are visited. Local disinfection of different parts of the ship is carried on while unloading. Complete and simultaneous fumigation of the whole vessel is done after it has been unloaded. Workers on the ship and wharf are kept under observation for 7 days after fumigation of the vessel.

Rat-proofing, especially of buildings used for foodstuffs, is carried out. The illustration reproduced shows two methods which are

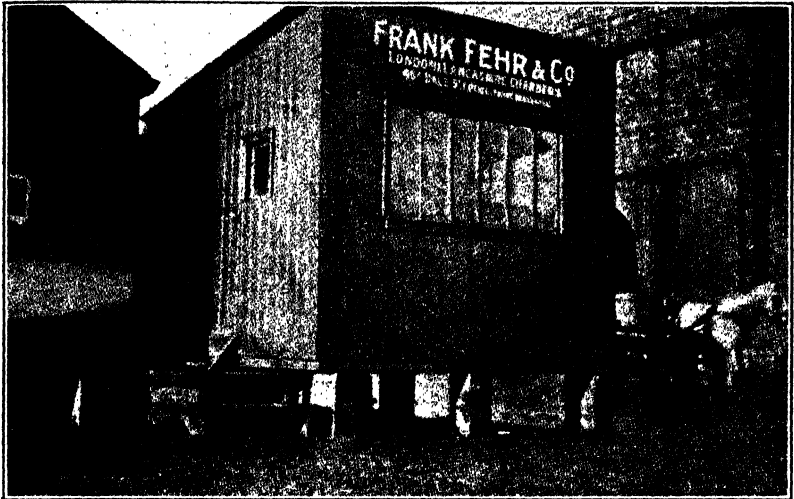


FIG. 44.—Raised-building method of rat-proofing sheds on the wharves in Liverpool. Huts and offices are raised 18 inches to 2 feet above ground level, and the space beneath is kept clear of refuse.

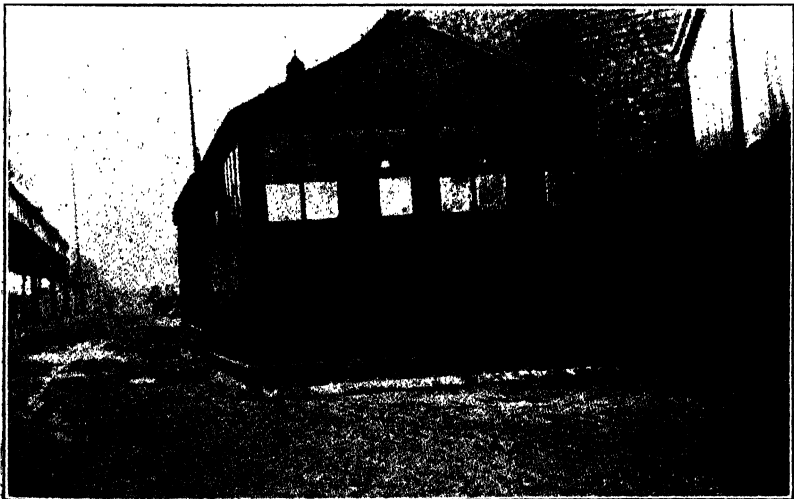


FIG. 45.—Method of rat-proofing sheds on the wharves in Liverpool by means of concrete curbing.

[Reproduced from *Public Health Reports*, Washington.]

employed. Huts and offices are raised 18 inches or 2 feet above the ground level, and the space beneath is kept clear of refuse. Concrete curbing is also made use of for the purpose.

ROMBY(Paolo). [Note sur les résultats obtenus par la vaccination anticholérique sur les troupes de la 3<sup>e</sup> armée italienne.]—[Summarized in *Arch. Med. et Pharm. Milit.* 1924. Dec. Vol. 81. No. 6. p. 850 and *Bull. Office Internat. d'Hyg. Publique.* 1925. Apr. Vol. 17. No. 4. p. 389.]

Anti-cholera inoculation carried out in the 3rd Italian Army during the cholera epidemic of 1915-16 is considered to have rendered invaluable service in limiting the spread of the disease amongst the troops and in favourably influencing cases which arose. Inoculation is especially indicated when the conditions of time and locality preclude the ordinary measures of prophylaxis, such as occur in zones where the troops are under fire from the enemy, or when units are subject to frequent and unforeseen changes of station. Under these circumstances inoculation presents a unique security in the campaign against cholera.

The operation can be conducted with speed and it confers a high degree of immunity, which, however, is of short duration, not extending beyond four months. Inoculation has no ill effects upon carriers of the vibrio. The majority of germ-carriers were found in vaccinated individuals.

#### WATER:

ROSS (W. C.) & BAGCHI (K. N.). **The Seasonal Variation in the Reaction and Hardness of River Water in India. Part II.**—*Indian Jl. Med. Res.* 1925. Jan. Vol. 12. No. 3. pp. 457-462. With 2 charts in text.

The investigation was begun in 1917 with a view to determining the relationship between the reaction of river waters and the use of alum preparations in their sedimentation.

In the first paper on the subject it was shown that there is a seasonal change in the reaction of river waters characterised by alkalinity for 6 to 8 months between October and May and acidity for 4 to 6 months between May and October. The alkalinity is due to the normal presence of carbonates of lime (chiefly) and of magnesia in the water, and the acidity is caused by the presence of free carbonic acid gas, which increases in quantity during the period of acidity, whilst at the same time the temporary hardness diminishes to a corresponding extent.

A series of experiments were first made to determine any change in the total quantity of calcium in the water, and also to show if any other salt of calcium took the place of the calcium carbonate (temporary hardness) which had disappeared. The total calcium was found to vary very little, and calcium nitrate was shown to replace the calcium bicarbonate to an extent that varied more or less directly with the acidity of the water.

Search for the source of nitric acid resulted in the discovery that the proportion of free nitric acid in rain was exceptionally high. The presence of free nitric acid in rain has been observed in many countries, but most observers have reported very small quantities. It seems that the atmospheric conditions in India are unusually favourable to

the production of nitric acid in the atmosphere, and it was found that in 1921, at Patna College, with a rainfall of 42.15 inches, there was a production of 8.76 pounds of nitric acid per acre, or 2.52 tons of nitric acid per square mile.

In these observations there is a complete explanation of the seasonal variation in the reaction of river waters, and also possibly a partial explanation of the continued fertility of the Gangetic plain, in spite of its continuous cultivation for centuries without any adequate quantity of manure being added to the soil.

PUBLIC HEALTH REPORTS. 1925. Apr. 10. Vol. 40. No. 15. pp. 693-722. With 6 charts in text. [10 refs.]—**Report of Advisory Committee on Official Water Standards.**

A committee composed of representatives from Government departments and scientific associations and of eminent sanitarians was appointed by the Surgeon-General in May, 1922, to review the Treasury Department standard for drinking water on interstate common carriers, and to recommend a standard or standards, based on specific methods of laboratory analysis and field surveys, to be applicable to all classes of drinking water supplies coming within the jurisdiction of the interstate quarantine regulations of the United States.

#### *Proposed Standards.*

The requirements recommended are as follows :—

##### I. As to Source and Protection.

(1) The water supply shall be :—

- (a) Obtained from a source free from pollution ; or
- (b) Obtained from a source adequately protected by natural agencies from the effects of pollution ; or
- (c) Adequately protected by artificial treatment.

(2) The water supply system, including reservoirs, pipe lines, wells, pumping equipment, purification works, distributing reservoirs, mains and service pipes, shall be free from sanitary defects.

NOTE 1. *Natural agencies*, affording more or less complete protection against the effects of pollution are, in surface waters : dilution, storage, sedimentation, effects of sunlight and the associated biological processes tending to natural purification ; and in the case of ground waters, percolation through the soil.

NOTE 2. *Adequate protection* by artificial treatment implies that the method of treatment is appropriate to the source of supply ; that the works are of sufficient capacity, well constructed, skilfully and carefully operated. The evidence that the protection thus afforded is adequate must be furnished by frequent bacteriological analysis and other appropriate examinations.

NOTE 3. *Sanitary defect* means faulty condition, whether of location, design, or construction of works, which may regularly or occasionally cause the water supply to be polluted from an extraneous source, or fail to be satisfactorily purified.

##### II. As to Bacteriological Quality.

(1) Of all the standard (10 c.c.) *portions* examined in accordance with the procedure specified below, not more than 10 per cent. shall show the presence of *B. coli* group.

(2) Occasionally three or more of the five equal (10 c.c.) *portions* constituting a single standard *sample* may show the presence of *B. coli*. This shall not be allowable if it occurs in more than :—

- (a) Five per cent. of the standard samples when twenty (20) or more samples have been examined.
- (b) One standard sample when less than twenty (20) samples have been examined.

NOTE.—It is to be understood that in the examination of any water supply the series of samples must conform to *both the above requirements*, (1) and (2).

*Definition—*

The *B. coli* group is defined, for the purpose of this test, as in\* Standard Methods of Water Analysis, American Public Health Association, New York, 1923.

The *standard portion* of water for this test shall consist of 10 cubic centimetres (10 c.c.).

The *Standard sample* for this test shall consist of five (5) standard *portions* of ten cubic centimetres (10 c.c.) each.

### III. As to Physical and Chemical Characteristics.

The water should be clear, colourless, odourless, and pleasant to the taste, and should not contain an excessive amount of soluble mineral substances nor any chemicals employed in treatment.

Under ordinary circumstances simple evidence that the water is generally acceptable in appearance, odour, and taste will be considered sufficient ; detailed analysis will only be required when there is some presumption of unfitness by reason of physical or chemical characteristics.

There are three Appendices to the Recommendations in regard to which short references may be made.

#### *Appendix I.*

Scope of requisite information as to source and protection.

1. A sanitary survey of the water supply should be made by a competent person.

2. A brief general description of the water supply should be submitted.

3. A brief summary of the pertinent facts relating to the sanitary condition of the water supply, as revealed by the field survey, should be submitted.

4. The agent who makes the sanitary survey should submit his personal opinion as to the sanitary character of the supply based on his field survey.

The scope of the survey is indicated, the necessary information required to form an adequate opinion on a water supply being detailed. Examples of sanitary defects are given under each class of water mentioned. The following are detailed : (a) Small ground water supplies ; (b) large ground water supplies ; (c) surface water supplies, unfiltered ; (d) surface water supplies, filtered ; (e) pumping station ; (f) distribution system.

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\* The definition is as follows : " as including all nonspore-forming bacilli which ferment lactose with gas formation and grow aerobically on standard solid media."

*Appendix II.*

## The Bacteriological Standard.

The examinations that have come to be generally recognized as of most value are :—

1. The count of total colonics developing from measured portions planted on gelatin plates and incubated for 48 hours at 20° C.

2. A similar count of total colonies developing on agar plates incubated for 24 hours at 37° C. (or, in some laboratories, incubated 48 hours at 20° C.).

3. The quantitative estimation of organisms of the *B. coli* group by applying specific tests to multiple portions of measured volume.

Of the above, the last-mentioned is almost universally conceded to be the most significant, and for this reason the Committee decided, after due consideration, to include only this test in the standard of bacteriological purity recommended.

*Appendix III.*

*B. coli* densities as determined from various types of samples.

This Appendix consists of the mathematical principles applied to the interpretation of fermentation tests. It contains many formulae of considerable complication to those who do not possess the mathematical mind. From these formulae it is demonstrated that :—

1. Where 10 per cent. of the 10 c.c. portions tested are positive the most probable density of *B. coli* is about 1 per 100 c.c., subject, to a probable error which is proportionate to the number of portions tested.

2. Given this or a less mean density, consistently maintained in the water from which the samples are drawn, less than 1 per cent. of the samples in a large series would be expected to show *B. coli* in three or more of the five 10 c.c. portions tested.

STREETEER (H. W.). **Some Preliminary Observations from a Study of Water Filtration Plants along the Ohio River.**—*Public Health Rep.* 1925. Jan. 30. Vol. 40. No. 5. pp. 202–213. With 3 text figs. [4 refs.]

Observations were made on the performance of 10 municipal filter plants of the rapid sand type located directly on the Ohio River, and taking their raw water supplies from that stream.

The 10 plants were divided, roughly, into two groups, according to the extent of treatment given to the water prior to filtration.

Group 1 consisted of five plants, three of which used primary plain sedimentation followed by coagulation and secondary sedimentation, and the remaining two made use of coagulation and sedimentation at both stages.

Group 2, also consisting of five plants, employed coagulation followed by a single stage of sedimentation.

The laboratory data were the 20° C. and 37° C. plate counts on standard agar medium, and the *B. coli* index, determined in the raw water and at each successive stage of purification up to and including the final chlorinated effluent. The data covered a continuous period of a full year excepting in one case in which observation could only be carried out for seven months.

The findings are as follows :—

1. With the continuous and effective use of chlorine disinfection



as a re-inforcement to filtration, the plants, considered as a group, apparently are fully able to deliver effluents of such bacteriological quality as is generally considered safe for a very large proportion of the time. Without the aid of chlorination they would undoubtedly be unable to do so.

2. The type of plant represented by Group I is more efficient in bacterial removal than the type represented by Group 2. Of the Group 1 type, plants employing coagulation with both stages of sedimentation are more efficient than those using plain sedimentation as the primary stage.

3. Earlier observations as to the existence of well-defined relation between the bacterial content of effluents and that of influents of water purification processes have been confirmed.

## FOOD.

MEDICAL RESEARCH COUNCIL. **Privy Council, Special Report Series, No. 91. An Investigation of the Salmonella Group, with Special Reference to Food Poisoning.** [SAVAGE (William G.) & WHITE (P. Bruce).]—159 pp. [50 refs.] 1925. London: H.M. Stationery Office. [Price 3s. 6d. net.]

The following paragraphs on food-poisoning as a pathological entity are of particular interest :—

“Salmonella food-poisoning is a disease due, in the majority of instances, to *B. aertrycke*. Our own extensive investigations of food-poisoning outbreaks, our survey of the literature, and of strains isolated by others suggests that, in this country at least, this organism is at present responsible for some three-quarters of the outbreaks. Next in importance as a causal agent is *B. enteritidis*, and it is possible that in this case the outbreaks tend to be particularly severe. During the course of our intensive study of food-poisoning outbreaks (1921-4) this organism has not been greatly in evidence; during this period we have only made a single isolation and two or three serological diagnoses of this type. It has, however, been several times isolated by others from food-poisoning cases during recent years, and the older literature suggests that it has been more frequently active in the past. It is possibly more prevalent in other countries.

“The Newport type is certainly responsible for an appreciable percentage of outbreaks, and both the Stanley and Derby types, though rare, participate. Though *B. suispestifer* has been known to cause food-poisoning, its importance is insignificant, and *B. paratyphosus B* and *B. abortus equi* are in all probability to be discounted entirely.

“In all the outbreaks, whatever the particular type of organism concerned, the features are essentially the same. The symptoms are those of intense gastro-intestinal irritation, and the violent local action appears to be directly attributable to a heat-stable irritant only extensively developed in those bacillary types responsible for food-poisoning. The brunt of the attack, whether by dead or living bacilli, falls upon the alimentary tract and is probably localized in it in the great majority of cases. Though the evidence is not complete, there is good reason to believe that general infection is exceptional, and that when this does occur death is the rule. The disease is caused by organisms of low invasive power, but with intense toxic action, which

if extended to the body in general, rapidly accomplishes the downfall of the latter. It is almost certainly the comparatively low invasive power of the food-poisoning types which explains the low death-rate (1 per cent. approx.) in a disease of such severity. The fatal cases tend to be associated in our experience with some weakened condition of the intestine such as old colitis, with some such debilitating condition as diabetes, or with infancy and old age.

"The important group of outbreaks which appear to be due to dead bacilli show us the essential features of *Salmonella* food-poisoning uncomplicated by infection. The cases most commonly met with are those due to the consumption of toxic canned foods. The features are those of acute gastro-intestinal irritation, developing suddenly within 1-4 hours of the peccant meal. In spite of the intense symptoms the sufferer is usually well on the way to recovery in 24-48 hours, recovery being the almost invariable rule. The sera of sufferers seldom show any appreciable development of agglutinins for *Salmonella* bacilli, and no pathogenic bacilli can be isolated from the food or faeces.

"The implication of the *Salmonella* group in this series of outbreaks is highly probable but difficult to prove. We have, however, found that known toxic canned foods, even after heating to 100° C., act upon the stomach of laboratory animals in the same irritant way as do similarly heated emulsions of *Aertrycke* and *Enteritidis* bacilli, and that these animals are just as unresponsive in general symptoms to the one as to the other. We have further shown with some certainty that when an emulsion of *B. aertrycke* or of *B. enteritidis* is heated, its irritant action tends to be accelerated; this would suggest a reason for the regularly early onset of canned-food-poisoning. (We have failed to show that this acceleration of action is due to the increased digestibility of the bacilli with liberation of toxin. Unlike living bacilli, boiled bacilli are rapidly digested by trypsin, but this treatment seems to reduce the irritant value of the culture.) These facts increase the probability stated above, but do not clinch the point. We have, however, been able to show that when toxic canned foods are emulsified and injected into animals, feeble agglutinating sera for *Salmonella* bacilli may sometimes be obtained. That these sera almost always cause a purely granulating agglutination of the usual food-poisoning types is exactly in accord with expectation, but owing to the low titre of the sera and lack of knowledge as to the specificity of granulating agglutinins we cannot yet offer this as conclusively implicating *Salmonella* bacilli in all canned-food-poisoning outbreaks."

A. A.

MEDICAL RESEARCH COUNCIL. **Privy Council, Special Report Series No. 92. Food Poisoning. A Study of 100 Recent Outbreaks.** [SAVAGE (William G.) & WHITE (P. Bruce)]—112 pp. 1925. London. H.M. Stationery Office. [Price 2s. 6d. net.]

This most valuable contribution to the literature should be added to the library of all concerned in Food and Food Poisoning. In the space available it will be possible only to indicate the main points, and the enquirer will need to refer to the report in the original to gain full advantage from the communication.

Section II deals with a Consideration of the Bacterial or Other Cause of the Outbreaks. The causes are divided into the following six groups:—

Group I. Cases associated with infection of the food with members of the *Salmonella* (or Gaertner) group of bacilli.

(a) Outbreaks due to living *Salmonella* bacilli.

(b) Outbreaks due to the presence of undestroyed *Salmonella* group toxins.

Group II. Outbreaks associated with organisms of dysentery type.

(Since the exact serological affinities of these strains are still under consideration the term "dysentery" is used in a comprehensive sense.)

Group III. Botulism group.

Group IV. Outbreaks associated with cheese.

Group V. Outbreaks of definite chemical origin.

(The word "chemical" is here restricted to outbreaks due to chemical substances of a known molecular grouping and not to complex bodies derived from the vital activities of bacteria.)

Group VI. Outbreaks of undetermined origin.

Group I is of such importance in connection with the causation of food poisoning that some of the salient bacteriological data in regard to it are briefly reviewed.

The following table may be accepted as an estimate of the present knowledge of the group.

#### DISEASE PRODUCING ROLE.

Type.	Man.	Animals.
<i>B. paratyphosus A.</i> ...	Paratyphoid fever ...	Not found.
<i>B. enteritidis</i> ...	Gastro-enteritis of food poisoning type. Occasionally sporadic cases of illness.	Disease of cows and calves. Disease of rats. Probably also in other animals.
<i>Derby</i> ...	Human food poisoning	Pigs; exact disease-producing role unknown.
<i>B. paratyphosus B.</i> ...	Paratyphoid fever. Probably never food poisoning.	*Not found.
<i>B. aertrycke</i> ...	Food poisoning. Sporadic cases of illness (possibly).	A widespread cause of enteritis in mice, guinea-pigs, and other rodents. Enteritis in parrots and other birds. Occasionally found in pigs. Occasionally a cause of calf enteritis. Does not occur commonly in rats.
<i>Stanley</i> ...	Food poisoning ...	Not yet isolated from animals.
<i>Newport</i> ...	Food poisoning. Possibly sporadic cases of illness.	Dogs suffering from enteritis, otherwise not known in animals.
<i>Reading</i> ...	Inadequate knowledge	Not so far isolated.
<i>B. abortus equi</i> ...	Not found ...	Abortion of horses
<i>B. suispestifer</i> ...	Paratyphoid (C type) fever. Food poisoning (very exceptionally).	Secondary invader in pigs in Hog Cholera. Occasionally as a primary cause of disease in pigs.

\* Some authorities claim to have isolated *B. paratyphosus B* from diseased animals.

As regards outbreaks due to the presence of undestroyed *Salmonella* Group toxins, which is a very important group, particularly in relation to canned foods, the methods of elucidation are given as : (a) Demonstration of the toxicity of the food by feeding animals with it or by injecting extracts of the suspected food into animals ; (b) demonstration of the production of specific agglutinins in the blood of patients suffering from food-poisoning ; and (c) demonstration of the production of specific agglutinins in animals through the injection into them of suitable emulsions of the incriminated food.

Group II. Outbreaks associated with organisms of the dysentery type are of peculiar interest in that this group of bacilli has not hitherto been recognised as capable of causing food poisoning. The symptoms in these outbreaks were in almost all cases definitely of the food-poisoning type, and not dysenteric.

In Group V, outbreaks of definite chemical origin, arsenic is at once the best known and most important. One example of poisoning by zinc and one by belladonna are cited. It is noteworthy that, although special attention was paid to canned food outbreaks, no instances of tin poisoning were found.

A summary of the 100 cases is given :—

Outbreaks probably not true food poisoning	...	...	3
Outbreaks due to members of the <i>Salmonella</i> Group	...	...	66
Outbreaks due to members of the Dysentery Group	...	...	4
Outbreaks due to <i>B. botulinus</i>	...	...	1
Outbreaks of definite chemical origin	...	...	2
Cheese-poisoning outbreaks	...	...	8
Mild evanescent outbreaks...	...	...	9
Outbreaks of undetected bacterial origin	...	...	7

100

In no instance has there been any evidence that *B. coli*, *B. proteus* and Morgan's bacillus had anything to do with the causation of outbreaks dealt with in this series.

Sections III deals with epidemiological features.

As regards seasonal prevalence it is confirmed that outbreaks are decidedly more numerous in the warmer months.

In the following table, the outbreaks are distinguished as :—

- B. Due with certainty or strong probability to living bacilli.
- T. Due to toxins of the *Salmonella* Group.
- U. The rest of the outbreaks. Most due to bacteria, and probably living bacteria, but classification uncertain.

Period.	No. of outbreaks.				Percentage prevalence.			
	All.	B.	T.	U.	All.	B.	T.	U.
6 " hot " months (May-Oct. incl.)	72	28	18	26	72	85	58	72
6 " cold " months (Jan.-Apr., Nov.-Dec.)	28	5	13	10	28	15	42	28
	100	33	31	36				

In this country the distinction between " hot " and " cold " months is somewhat arbitrary ; still, the outbreaks due to living bacilli show a marked prevalence during the summer.

The following possibilities are suggested to account for the seasonal

prevalence being so definite, especially for the outbreaks due to a living bacillus :—

- " 1. A greater virulence of *Salmonella* strains in hot weather.
2. A larger dose due to greater multiplication on the vehicle before ingestion.
3. Greater opportunities for infection of food in summer.
4. A greater sensitiveness of the alimentary tract of the human host in warmer months."

As regards the physical condition of the incriminated food, the present series shows that, with few exceptions, the food was almost invariably perfectly good to the physical senses when eaten.

A table shows that nearly all the outbreaks from undestroyed *Salmonella* toxins were from canned foods. Made-up meat infections are mainly associated with living bacilli.

The infectivity rate is, in general, high ; often all who ate the incriminated food were made ill. The influence of cooking is obviously of importance.

Case to case infectivity is rare in food poisoning outbreaks, and the present series supports this view.

As regards the prevalence in institutions, an unusually large number (11 per cent.) in the present series of outbreaks occurred in asylums, workhouses, hospitals and schools.

Section IV deals with clinical features.

The symptoms were almost invariably those of gastro-intestinal irritation or inflammation of various degrees of severity.

Section V treats of certain special types of food poisoning.

Botulism is first noted. The onset of symptoms is usually from 18 to 36 hours after ingestion of the poison, but it may be considerably advanced or delayed. As a rule, the onset is gradual. Symptoms may be grouped as follows :—

- (1) Vision and eye disturbances.
- (2) Throat symptoms.
- (3) General muscular weakness.

Nearly as important as the positive signs is a consideration of those which do *not* occur.

*Sensory disturbances.* Apart from any initial gastric distress or headache the patient usually suffers no pain.

*Abdominal symptoms.* Apart from the initial irritation there is no abdominal pain and constipation is usual.

*Mentality.* Mentality and consciousness usually remain clear until shortly before death. Apathy and somnolence are characters only of the later stages.

*Temperature.* Any fever is rare, and the temperature is usually subnormal. Later in the illness the pulse rate may be markedly increased. The combination of subnormal temperature and rapid pulse is an important diagnostic point. Respiration is not disturbed until quite late. The sphincters are not affected.

As to the material to submit for bacteriological examination, two lines of proof are available :—

- (1) The isolation of *B. botulismus*.
- (2) Demonstration of the presence of botulinus toxin.

To aid in securing proof the following materials should be submitted :—

- (1) *The suspected food.* Every endeavour should be made to secure some of this, even minute quantities may be adequate. Traces

adhering to jars ; remains in tins, even if thrown away, are all worth transmitting.

(2) *Post-mortem material from fatal cases.* All the different organs, and particularly pieces of the large and small intestine, should be transmitted.

(3) *Clinical material.* Blood specimens for agglutination are useless, except to exclude *Salmonella* food-poisoning. Samples of faeces may show spores, but this is doubtful.

Section VI deals with the Paths of Infection.

Special attention was directed to infections by the *Salmonella* Group because these organisms are responsible for all the important and severe outbreaks of food poisoning in this country.

Investigators have frequently accepted the explanation that the food has been subject to ordinary excretal contamination. This, however, cannot be a satisfactory explanation, as the infection is due to a *specific* bacillus, and there is no evidence that such bacilli are natural inhabitants of human or animal intestines.

As a primary reservoir of infection there are three possibilities :—

- (1) A habitat outside the animal (including human) body.
- (2) Infection from a human case—infected sufferer or passive carrier.
- (3) Infection from an animal source—specifically infected animal or passive carrier.

As regards the above :—

*A habitat outside the animal body of Salmonella bacilli.*—This is possible, but there are no facts that suggest that it is probable.

*Infection from a human case.*—From the scanty facts available it is suggested that *B. aertrycke* and *B. enteritidis* are unlikely to accommodate themselves to a saprophytic life in the human intestine, and are usually eliminated soon after recovery.

The view is expressed that human carrier-infection is, at the most, a very rare source of infection of the food in food-poisoning outbreaks.

*Infection from an animal source.*—Two possible sources of infection have to be distinguished :—

- (1) Due to the meat or milk of an animal infected with a *Salmonella* bacillus being used as part of the implicated food.
- (2) Due to sound food being infected with bacilli derived from an animal either suffering from a *Salmonella* infection or acting as carriers of such bacilli.

In one outbreak *B. aertrycke* was isolated from one of the cows of a herd, the infection was traced back to this herd and to the mixed milk which contained milk from the diseased animal. In another outbreak in which 25 cases were due to the consumption of mutton, *B. aertrycke* was isolated from the bone marrow of the joint of mutton, as well as from other sources.

In at least six outbreaks there was clear evidence that only part of the contents of the tinned-food was toxic, sometimes the unsound portion was at the narrow end of the tin, and at others at the broad end. If it be agreed that the meat from an infected animal is contained in the tin, it is very difficult to conceive that such infected meat should be confined to one end of the tin. On the other hand infection of a sound meat in the tin or when being introduced into the tin would be confined to portions of meat in direct continuity, and the phenomenon of one part only being toxic is explainable. This fact strongly suggests that infection was post-mortem, and not ante-mortem.

A point which is of great importance, and which is well illustrated

in the present series, is the frequency with which the vehicle of infection is a food which has been heated and then allowed to cool slowly.

Though the fly as a transmitter of infection cannot be refuted, there was no positive evidence in favour of a fly vehicle in the series of outbreaks under review.

Section VII deals with the prevention of outbreaks of food poisoning.

Section VIII deals with the investigation of food poisoning outbreaks.

Three important circulars have been issued to Medical Officers of Health in this connection.

- "1. Memorandum by the Local Government Board on the investigation of outbreaks of illness suspected to be due to food poisoning. Issued in September, 1911.
2. Steps to be taken by Medical Officers of Health in cases of suspected food poisoning. Issued by the Ministry of Health, January, 1921.
3. Food Poisoning Inquiries. Issued by the Ministry of Health, 10th August, 1921.
4. Food Poisoning Inquiries. Issued by the Ministry of Health, 1st April, 1924."

The circular of August, 1921, includes a memorandum upon the collection and transmission of samples. This memorandum, in an extended and amplified form resulting from additional experience, is reproduced in the present Report.

## CONSERVANCY.

BARNES (M. E.). **The Utilization of Solar Light and Heat in the Treatment of Night Soil.**—*Amer. Jl. Hyg.* 1925. Mar. Vol. 5. No. 2. pp. 202-216. [11 refs.]

This is a suggestion for experimenting with a de Saussure box in the treatment of night soil, the action of the solar light and heat rendering it incapable of transmitting infection, especially as regards protozoa and helminths.

In 1766 DE SAUSSURE invented a "hot box" which consisted of an insulated air-tight wooden box, blackened inside, and covered with two layers of plain glass with an air space between them. In 1837, Sir John HERSCHEL experimented with a similar box and recorded a temperature of 248° F. on December 5th with such an apparatus enclosed in a second glass covered box, whose sides were banked with sand for protection, as were those of the inner box. Subsequently, he cooked eggs and other articles of diet in his "hot box." In 1883, a description was published by J. HARDING of a distillation plant erected in Chili which operated on this principle. This plant produced 5,000 gallons of distilled water per day during the summer months.

The present experiments were carried out by the writer in Siam. The de Saussure box employed consisted of a pine-wood box 20 by 14 by 6 inches in length, width and depth respectively, the boarding being approximately 1 in. thick. A shallow tin vessel, made by splitting a five-gallon oil tin longitudinally, was placed in this box and a tight-fitting cover of window glass was provided. The tin was blackened to increase the absorption of the solar rays. Controls were carried out with similar apparatus without any glass covering. The boxes were placed flat on the ground in such position as to receive

the direct rays of the sun, but no change was made in their position to correspond with changes in the elevation of the sun. Thermometers were placed in the boxes to record the temperatures observed.

In one series of experiments the maximum temperature in the covered box was 200° F. (93.3° C.) and for a period of more than six hours it exceeded 126° F. (52.2° C.). In the control box without a glass cover the maximum was 124° F. (51.1° C.), which was maintained for only about 15 minutes. A litre of water introduced into the tin vessel was on four days recorded to reach 158°, 150° 146°, and 154° F. respectively, and, moreover, was maintained at above 122° F. for periods of 4 to 5 hours on each of these days, during which it should be noted there was no clear sunshine, excepting on one afternoon. In these experiments a single layer of glass was used.

In another series of experiments using a box with a double glass cover with 1 in. interspace, 5 gallons of crude oil were raised on two occasions to 142° F., and once the oil was maintained at over 122° F. for more than five hours.

There is considerable loss of heat involved if the box used is too deep, owing to interference with the passage of the sun's rays by the sides. It is probable that 12 to 15 inches in depth might be used without too great a loss of heat resulting.

In a double glass covered box experiments were conducted with faecal matter containing hookworm ova and newly-hatched, active larvae. Ten specimen tins of quarter-oz. capacity were exposed, the covers of the tins being removed, in the de Saussure box, from 12 noon to 1 p.m., during which time the thermometer in the box registered 220° F. After removal from the box, the larvae were found to be dead, and no larvae developed from the faecal matter, which was mixed with moist soil and examined daily for the period of one week. Opportunity to continue this line of investigation was lacking.

BOECK (1921) gives the thermal death point of protozoan cysts as follows, heavy mortality in all cases beginning at temperatures approximately 10 degrees below the maximum :—

<i>E. histolytica</i> .....	68° C.	<i>Iodamoeba bütschlii</i> .....	64° C.
<i>E. coli</i> .....	76° C.	<i>Giardia intestinalis</i> .....	64° C.
<i>E. nana</i> .....	64° C.	<i>Chilomastix mesnili</i> .....	72° C.

Intestinal helminths are even more vulnerable to heat. ASADA (1923) states that *Ascaris* larvae in the egg shell are killed if heated for 10 minutes at 50° C. STILES (1921) has indicated the effects of various temperatures upon hookworm ova and larvae as follows :—

40°–50° C.—Eggs have been observed to hatch at 40° C., but in general, constant temperatures above 37° C. are reported as unfavourable to fatal for eggs and larvae. However, both eggs and larvae can stand 40°–50° C. for a few minutes and live.

50°–60° C.—Fatal to eggs and larvae in 1 to 5 minutes.

Above 60° C.—Fatal to eggs and larvae almost instantly.

TSUTSUI (1924) has shown that 55° C. is the highest temperature to which hookworm ova and larvae can be exposed and live. On account of the coagulation of tissue fluids which takes place at temperatures around 60° C., it is highly improbable that any of the animal parasites could survive more than momentary exposure to such temperatures.

As regards the bacteria, JORDAN (1921) states that “the vegetative forms of most bacteria are killed at 55°–58° C. by 10 minutes exposure to moist heat.” He places the thermal death-point of the typhoid bacillus and of the spirillum of Cholera at 58°–60° C.



There appears to be little doubt that, under laboratory conditions, if these various organisms are brought to the actual temperatures indicated, they are killed. The question is whether the constituents of night soil are such as to protect the organisms from reaching the fatal temperatures; the depth of penetration of the heat into faecal matter exposed in the boxes has not yet been determined.

The author is of opinion that the interruption in days of sunshine would make it impracticable as the sole method of treatment, but considers that this method may well prove a valuable supplementary means of treatment in communities where the bucket system of collection is in operation. As such, he hopes that investigators in widely separated regions will undertake experiments with the apparatus.

LEVERMORE (F. E.). **Sanitation in British Guiana.**—*Jl. Roy. San. Inst.* 1925. Mar. Vol. 45. No. 10. pp. 433-438.

In this paper a general account of sanitation in British Guiana is given. It is of interest because it deals with the conditions in a country which is, in parts, very flat and, indeed, lying from 4 to 5 feet below sea level. Pit latrines in low-lying land have been successfully designed: a mound of earth 2 ft. high is prepared through which a pit is dug, penetrating the soil until just before the sub-soil water is reached. Upon this mound a structure is erected, and the earth gained from the pit is close-packed around, with the object of preventing access to fowls and pigs.

Thus designed, the life of a pit may be considerably over a year, and when full an excavation is made at one side of sufficient depth to allow of the contents being removed and dealt with. The pit is treated periodically with an emulsion of crude petroleum and soap, with the addition of a small quantity of crude carbolic, if desired. The method is stated to work efficiently, economically, and without causing nuisance, provided it is properly carried out.

KOBAYASHI (Harujiro), SHIIBA (Yoshiya) & MIDZUSHIMA (Haruwo). [**Studies on the Hygienic Disposal of Sewage. Communication I.**]—*Tokyo Ijishinshi (Tokyo Med. News)*. 1925. Jan. No. 2404. [Summarized in *Japan Med. World*. 1925. Mar. 15. Vol. 5. No. 3. p. 68.]

The authors carried out experiments for the employment of garbage as such, for manuring purposes. Admixture was made with peat, but the proportion of the materials is not mentioned in the summary. *B. coli* was killed in 13-17 days or more; *B. typhosus* in 6-7 days; ascaris eggs required 1-3 months. Further particulars will be given in a future paper.

## SMALLPOX VACCINATION.

OWEN (W. E.). **The Kavirondo Practice of Inoculation with Smallpox.**—*Kenya Med. Jl.* 1925. Feb. Vol. 1. No. 11. pp. 333-335.

Amongst both the Bantu and Nilotic Kavirondo a custom pertains of taking pus from a smallpox patient, mixing it with a native prepared powder, and inoculating people with the preparation so as to induce a mild form of smallpox.

The origin of the custom is lost in the dim past, but some state that it was first taught by the Masai. The receipt for the preparation of the powder is a well-guarded secret, and it is very difficult to get the "medicine men" to divulge what tree or shrub is used in making the powder. The tree from which the preparation is made is planted in some secret place in the bush, and the fallen leaves and roots are used. Only those leaves that have fallen right side up are taken, they are then burned and the ashes are used with the finely-pounded dried root, the mixture being ground together.

When smallpox breaks out and it is decided to inoculate, the medicine man is called. He brings the powder and, obtaining some pus from a ripe pustule, mixes it with a little of the powder. The person to be inoculated is incised in two places, and the mixture of powder and pus is dusted into the cuts. The inoculators say that, in three days, if the person is a woman, or in four if a man, the site of inoculation shows that the pus has taken effect, and that in a week the patient will be out all over in smallpox.

The medicine men assert that the inoculation is never followed by fatal results, but a mild form of the disease shows itself. One man questioned made the statement that he and his family had treated hundreds and never had a death occurred as a result of the inoculation.

NOTE.—A small quantity of the powder has been examined by the Government Analyst, Mr. W. Colet BIRCH, with the following result :—

The powder was yellow-brown in colour and neutral to litmus. Under the microscope all that was seen was what was apparently plant tissue of a pink colour. From 1.15 gms. an extract was obtained weighing 3.2 mgms. This residue was intensely bitter, and gave the general reaction for alkaloids with gold chloride, phosphomolybdic acid and iodine. The extract from a further quantity of 0.6 gm. of powder gave the blue colour characteristic of morphine with Fröhde's reagent, but further tests failed to confirm its presence. Strychnine is absent. The small amount of powder available for analysis did not permit of the establishment of the identity of the alkaloid which appears to be present.

JAMESON (R. W.). **Concerning the Two Types of Smallpox and the Administrative Methods applicable to them.**—*Lancet*. 1925. Jan. 10. pp. 92-94.

A summary of this article is as follows :—

1. *Nomenclature*.—The author suggests one that can only be provisional until more is known of the nature of the virus concerned in variola major and variola minor respectively. One recognises this by using these two terms which take note of their clinically allied nature and their main difference, that of virulence, while they are calculated not to confuse the clinician as the terms mild and severe might do.

2. *Vaccination*.—Owing to the widespread objection to submit to vaccination and also to the fact that the immunity conferred by vaccination only lasts for a term of years, the present attempt to control smallpox by the wholesale vaccination of infants has failed. It is suggested that variola outbreaks would be better controlled if governmental vaccination effort were confined to treating outbreaks, and then used intensively, that in the presence of variola major one cannot have too much vaccination, and therefore increased powers of compulsion are necessary for those times.

3. *Administration*.—That the areas of smallpox administration should be enlarged as making for efficiency and economy in dealing with the disease. That the efficiency of the machinery in use for dealing with this and other diseases would be enhanced if the Privy Council from time to time assessed the value of the procedure employed.

LEDINGHAM (J. C. G.). **Alastrim and Variola. The Experimental Side of the Question.**—*Lancet*. 1925. Jan. 24. pp. 199–201. [9 refs.]

*Summary* :—

"1. Mild smallpox behaves like ordinary smallpox when transferred directly to the monkey.

"2. Direct transference to calves and rabbits is uncertain, and is most likely to fail, though the chances of securing some sort of atypical take at the first attempt would appear to be greater than in the case of variola. There may doubtless be slight differences between the various alastrims with respect to their animal affinities.

"3. Variolization of the calf can be accomplished by the usual passage methods.

"4. Allowing for certain peculiarities which distinguish the experiments with Australian alastrim, there would seem to be no doubt that the mild smallpox of English origin behaves in all important respects like ordinary variola.

*Conclusion* :—

"The persistently non-toxic and non-lethal character of the prevailing smallpox is consistent with the view that the virus concerned is merely a variant of variola whose toxic properties for the human organism have become suppressed, while its affinities for other animal species have not appreciably changed. The intrinsic and epidemiological peculiarities of mild smallpox suggest tempting analogies with certain features exhibited by non-toxic or non-virulent varieties of bacteria generally, which recent research on bacterial variation has disclosed."

## DISINFECTION.

TRIMBLE (H. E.). **The Vacuum-Cyanide Method of Delousing Clothing and Baggage. Experimental Data upon which the Procedure at the New York Quarantine Station is based.**—*Public Health Rep.* 1925. Feb. 20. Vol. 40. No. 8. pp. 335–351. With 5 figs on 3 plates. [4 refs.]

Methods of disinfecting clothing and baggage by steam are not entirely satisfactory. Felt, rubber, leather, fur and other materials are frequently made up into clothing, or bags and trunks which almost invariably have leather, paper, and glue about them, are damaged by steam. It requires time and labour to open each package, sort out the articles that steam would damage, sterilize the remainder, and repack. The ideal method should kill all animal and insect life within a package that has neither been opened nor unlocked, and do it without damage to the contents. It should also be sufficiently rapid to allow clothing to be disinfested while the owner is taking a bath.

In 1916 Surgeon GRUBBS introduced a method of treating clothing

and baggage with a vacuum hydrocyanic acid gas process. This was first done at the Boston Quarantine Station, and in 1921 the method was introduced at the New York Station, and at the latter place more full investigation was directed to determine the limitations of the vacuum cyanide process, or to find something better.

The conclusions arrived at were as follows :—

1. The process is an improvement over the steam method since the packages are undisturbed and the contents uninjured. It has, however, distinct limitations.

2. Cyanide gas penetrates fabrics so slowly that it is applicable only to delousing when aided by an initial vacuum ; the higher the vacuum the quicker and deeper the penetration.

3. For efficiency and practicability three important factors are necessary—concentration of the gas, degree of the initial vacuum, and length of exposure.

4. Lice and lice ova are easily killed by cyanide gases. The minimum lethal concentration of HCN gas at 15 minutes exposure was determined to be that from about 18 ounces of sodium cyanide per 1,000 cubic feet.

5. Vacuums of 26 in. of mercury and air pressures of 15 lbs., or combinations of these, but without gas have no effect on lice or ova even if used over longer periods of time than those used in actual delousing.

6. An air pressure of 15 lbs. produced and held after the introduction of gas into the chamber does not materially aid in the penetration of the gas.

7. Dry heat of 72° C. with a vacuum of 26 in. and 15 minutes exposure did not appreciably aid the vacuum in the penetration of the gas.

8. A secondary vacuum is of aid in clearing gas out of bundles of clothing.

9. High concentrations of HCN require that materials be well ventilated after fumigation.

10. The odour and lachrymatory effect of CNC1-HCN gas mixture (cyanogen chloride-hydrocyanic gas) may ventilate out and yet leave a dangerous amount of HCN gas in fabrics. Hence there is no advantage in using CNC1-HCN rather than HCN.

11. Ship fumigation with cyanide gases (5 ounces sodium cyanide per 1,000 c. ft. for 2 hours without a vacuum) cannot be expected to kill all lice or ova.

The following recommendations were made :—

(a) That HCN gas be continued as a routine delousing agent for the clothing of immigrants, using from 143 to 285.7 ounces sodium cyanide per 1,000c. ft. (12 to 24 ounces per 84 c. ft. chamber), or from 72 to 143 ounces of liquid HCN ; that the initial vacuum be 26 in. ; and that the exposure be at least 30 minutes.

(b) That in loading the sterilizing chambers the clothing bags and the baggage be placed on wire racks, thus separating them somewhat, rather than packing them in tightly without the racks.

(c) That, after fumigation, the clothing bags be hung up, out of doors if possible, but at least in a stream of fresh air, until odour of gas disappears, before being returned to the immigrants.

(d) That the same concentration of gas and initial vacuum as recommended for clothing bags be used for baggage, but that the exposure be for one hour. That the covers of trunks and other very large cases be opened for fumigation. As it usually is at least 8 to

24 hours after fumigation before the immigrant has the opportunity of unpacking his larger pieces of baggage, airing of the same is not necessary.

(e) That the clothing of immigrants with typhus or exposed to typhus be sterilized by the vacuum pressure steam process; shoes, hats, suit cases, etc., which steam would injure, to be subjected to the standard vacuum cyanide process.

A few tests were made with other gases, but they indicated that to obtain good results such high concentrations would be necessary that the cost would be prohibitive and the time of the fumigation process too long. The gases experimented with included ether, chloroform, carbon bisulphide, carbon tetrachloride, and formaldehyde.

NEWSTEAD (R.), EVANS (Alwen M.) & POTTS (W. H.). **Report on the Investigation into the Destruction of Vermin by Hydrogen Cyanide, with Especial Reference to Bed Bugs.**—*Ann. Trop. Med. & Parasit.* 1925. Mar. 31. Vol. 19. No. 1. pp. 91–118. With 1 plate & 6 text figs.

This investigation was carried out at the request of the Liverpool Port Sanitary Authority, with the object of determining the efficacy of various strengths of Hydrogen Cyanide in the destruction of vermin, especially bed bugs, under natural conditions on board ship.

In ships, the bed bug favours similar situations as in houses, but one or two special sheltering places require attention. Tongue and groove matchboarding, which so often covers partitions, forms a very good refuge, especially when there is a certain amount of space behind the tongue and groove boarding into which the bugs can penetrate. The framework of bunks is also of importance. In certain types of bunks the frame consists of hollow tubes with small openings at the ends. Upright stanchions with loose fitting sockets at either the top or the bottom provide access into the tube easily available to bugs. A third refuge on board ship was found in piles of life-jackets, in the folds of the canvas coverings of which bugs were present. The above situations demand special attention as they afford exceptional protection for the vermin against the action of the gas.

As the result of the investigation the following facts emerged :—

1. A concentration of 0·2 per cent. of Hydrogen Cyanide acting for 3 hours, or 0·3 per cent. acting for 1 hour is not sufficient to kill every bug.

2. A concentration of 0·3 per cent. of the gas acting for 3 hours will kill all bugs present, except where they can retire behind tongue and groove boarding.

3. Eggs of bugs are not more resistant to Hydrogen Cyanide than are the adults.

4. A concentration of 0·3 per cent. of the gas acting for 1 hour is sufficient to kill lice, both adults and eggs. A concentration of 0·2 per cent. of gas even if acting for 3 hours does not kill.

5. A concentration of 0·2 per cent. of gas acting for 3 hours kills both fleas (adults and larvae) and rats.

6. Spraying with liquid cyanide gives better results than does the dumping method as it tends to give a more uniform concentration throughout the area.

The recommendations made were as follows :—

- (a) That a concentration of 0·3 per cent. of Hydrogen Cyanide acting for a period of 3 hours should be used.

(b) That where matchboarding is present, one or two boards should, if possible, be removed, in order to allow the gas easy access into the cavity behind.

(c) That where bunks with hollow metal frames are present they should be taken to pieces, when this is practicable, and the tubular portions laid horizontally, so that the gas can penetrate easily into their interior. Or better, as a preventative, the ends of the tubing should be hermetically sealed.

HARNED (R. W.) & ALLEN (H. W.). **Controlling Bedbugs in Steam-Heated Rooms.** [Abstract.]—*Jl. Econom. Entom.* 1925. Apr. Vol. 18. No. 2. pp. 320-329. With 2 text figs.

During the summer of 1924 experiments were conducted in the dormitories of the Agricultural and Mechanical College of Mississippi for the control of bedbugs, *Cimex lectularius* Linn, by heat.

Superheating of the infested rooms was secured by closing the rooms and turning on the steam during the hot summer weather. At temperatures of 120° F. and above, absolute control was secured by treatment of several hours' duration. A very high percentage mortality was secured by exposure to temperatures averaging 110° F. when maintained for two days or more.

The results obtained by the treatment of 350 dormitory rooms have proved so much better in respect to the saving of labour, safety and effectiveness than the method of fumigation with hydrocyanic acid gas that the latter method has been abandoned in favour of superheating for control of this pest.

During the trial it was found that the temperatures attained varied considerably in the different rooms. Rooms facing south received the additional heat of several hours of sun, and in most cases attained a higher temperature than rooms facing north and receiving no sunlight. Several rooms were discovered in which the temperatures were far below the average as the result of defective heating units. The daily fluctuations of temperature in the rooms closely followed the usual outside fluctuations, rising from the lowest in the morning to the highest in the late afternoon and falling away again at night.

Up to December 27th, 1924, not a single complaint about bedbugs has been received from any of the rooms that were the subject of experiment, although the rooms have been occupied almost continuously, and some of them have been carefully inspected. Total mortality can be secured by a few hours exposure to 120° F.; a very high percentage mortality can be secured at as low a temperature as 110° F., when this is maintained for two days.

The advantages of the method are detailed as follows :—

Labour outlay is much less, since it is not necessary to seal cracks, place fumigants, or handle furniture. No expert manipulation is required as the process can be managed by the regular organisation of hotels, hospitals, and dormitories or by residents of houses without calling in outside assistance. The method is safe, wood-work is not apparently injured; it is effective, nymphs and adults being destroyed with equal readiness, and this is also apparently true of the eggs. Results can be determined at any time during the process as the rooms may be entered for short periods without excessive discomfort. In degree of penetration this method equals fumigation at its best, and it is far superior to application of contact insecticides by hand.

DE ALMEIDA (Eurico). **O valor da desinsecção como arma profiláctica no combate de pestilências exóticas.**—*Revista Méd. de Angola*. (No. especial 1º Congresso de Med. Trop. da Africa Occidental. Vol. 3. 3a., 4a. e 5a. Sessões.) 1923. Aug. No. 4. pp. 35-39. With 9 figs.

By means of a simplified form of the Canadian Disinfector, two of which were in use, the author succeeded in stamping out in five months a fairly severe epidemic of "spotted fever" [apparently typhus], in which 2,068 persons were attacked and 523 died. During this period 116,813 articles of clothing belonging to 27,000 lousy persons were disinfested, and the author speaks in terms of high praise of the value of this apparatus for dealing with insect-borne diseases.

H. Harold Scott.

### CHILD WELFARE.

CHINA MEDICAL JOURNAL. 1924. Nov. Vol. 38. No. 11. pp. 923-929.—**Child Labour in China.**

The subject having been brought to the notice of the Municipal Council of Shanghai, a commission was appointed in January, 1923, "to inquire into the conditions of child-labour in Shanghai and the vicinity, and to make recommendations to the Council as to what regulations, if any, should be applied to child-labour in the foreign settlement of Shanghai, having regard to practical conditions and to local conditions generally." In July, 1924, the Commission presented a unanimous report. Amongst the witnesses who gave evidence were doctors, officers of the Municipal Service, employers, contractors, and social service workers.

In the report the industries in which the children are employed are divided into three main groups: (a) Domestic service; (b) shops, workshops, laundries, and the building trades; (c) mills, factories, and similar places of industry.

The medical evidence taken by the Commission may be summarized as follows:—

The country children in China are of good physique, whilst those living in the cities are, generally speaking, below the standard of Western countries. Tuberculosis is particularly prevalent in the towns. One witness expressed the opinion that the children were worse off in the modern factories than in their native homes, because of the humidity of the air which was bad for the tuberculous child. Crowded living conditions are to a great extent responsible for the poor physique observed. By all it was agreed that the existing industrial conditions in Shanghai are extremely adverse to the bodily and mental welfare of the Chinese child employee. Such children, as a body, were said to be physically inferior to those not employed, but no definite measurements or other particulars are given. Industrial accidents were largely attributed to fatigue and carelessness following on long hours of monotonous work.

The Commission made the following main recommendations:—

1. Power should at once be sought to make and enforce regulations prohibiting the employment in factories and industrial undertakings of children under 10 years of age, rising to 12 years within four years from the date when the regulations come into force.

2. Children under 14 years of age should not be employed for longer than 12 hours in any period of 24 hours, such period of 12 hours to include a compulsory rest of 1 hour.

3. Night work for young children is such a serious evil that, while at present, owing to specific difficulties, no action seems possible, the question should be further considered by the Council at the end of a period of four years.

4. Every child under 14 years of age employed in factories and industrial undertakings should be given 24 hours continuous rest in at least every 14 days.

5. The employment of children under 14 years should be prohibited at any dangerous unguarded machine, in any dangerous or hazardous place, or at any work likely seriously to injure body or health. Power of closure of any dangerous or hazardous premises where such children are employed, until they are made safe, should be sought.

### MEDICAL INSPECTION OF SCHOOLS.

CHUBB (Elsie M.). **Defects in School Children in the Cape Province.**—*S. African Med. Rec.* 1925. Feb. 28. Vol. 23. No. 4. pp. 67–69.

In reckoning the statistics given only those children are included who fall into what is known as the "routine age groups." In 1924, the routine age groups included all children born in 1909 and 1916; with the very mobile school population that appertains, this is the best way of insuring that children who move from place to place are not left out. The years are chosen so that children are seen shortly after their admission, and again towards the close of the compulsory school course. The statistics of the routine age group give the average condition of the school-going population.

In reckoning defects there must be some sort of convention as to the standard adopted. If all minor departures from normal were included the figures would be much swollen, and would have little value.

#### SUMMARY OF STATISTICS.

			Number examined in age groups.		Percentage defective.		Percentage recommended for treatment.	
			1922.	1923.	1922.	1923.	1922.	1923.
Boys	...	...	4,009	4,271	40.2	37.3	23.6	22
Girls	...	...	4,314	3,993	38.4	36.3	23	23
Total			8,323	8,264	39	37	23	23

37–39 per cent. of children in the routine age groups have defects sufficient to act as a handicap to efficiency and health, and 23 per cent. actually needed treatment and were recommended to obtain it.

Dental decay accounted for 14–16 per cent. of the defects, only cases of oral sepsis or cases with four or more decayed teeth being included: had all cases of dental caries been included the percentage in many areas would be from 80–90 per cent.



It was noticeable that malnutrition, physical defects and the poor white problem run parallel; some of the poor white colonies seem to be breeding grounds for physical inefficiency, to say nothing of mental defect.

Eye defects are considerably higher in girls than in boys; it is thought that the cause is due to the amount of needle work, music and indoor occupation expected of girls compared to the more out-door life of the boys.

The tendency to enlarged tonsils and adenoids is more marked on the Karoo and in dusty towns than at the sea coast.

Tonsilitis, heart lesions due to rheumatism and chorea are commoner at high altitudes than in the damper coast area.

Trachoma occurs in Namaqualand, round about Knysna, Oudtshoorn, and down the Gamka valley, all of which places have a high proportion of poor whites.

Tuberculosis amongst European children is almost always of the bone, joint, or gland variety. Lung tuberculosis is frequently present amongst coloured children.

As a cause of crippling in the country infantile paralysis ranks much higher than tuberculosis. It is the impression of the writer that it is much commoner at high altitudes than at the coast.

OROSA (S. Luna). **Health Inspection of School Children.**—*Jl. Philippine Islands Med. Assoc.* 1925. Jan. Vol. 5. No. 1. pp. 23-24.

An individual health inspection, held at Meisic in 1924, for the detection of communicable and contagious diseases and physical defects of children who were to be admitted into the city schools gave the results shown in the following table. The children were of varying ages, since they included primary, intermediate, and high school pupils, thus ranging from just over 7 up to 20, 25 years or over.

Of the 10,237 children examined only 3,710, or 36 per cent., showed no defects or diseases. 500, or 4 per cent., were suffering from "excludable" diseases, the commonest being trachoma.

Children examined				...	10,237		
Normal	...	...	...	...	3,710	...	36 per cent.
With defects	...	...	...	...	6,527	...	59 "
Excludable diseases...	...	...	...	...	500	...	4 "
Trachoma	...	...	...	...	310	...	3 "
Acute conjunctivitis	...	...	...	...	60	...	0.5 "
Scabies	...	...	...	...	80	...	0.7 "
Others	...	...	...	...	50	...	0.4 "
With non-excludable diseases	...	...	...	...	6,027	...	—
Dental caries	...	...	...	...	4,240	...	41 "
Enlarged tonsils	...	...	...	...	593	...	5 "
Miscellaneous diseases	...	...	...	...	1,340	...	13 "

An educative campaign against dental defects is of prime importance, as also is one against trachoma.

GONZALEZ (Andelfo). **Estudio de las condiciones sanitarias de los niños en las escuelas de Bogotá.**—*Repert. Med. y Cirug.* Bogotá. 1924. Nov. Vol. 16. No. 2. (No. 182). pp. 82-100.

In this paper are recorded the results of examination on the usual lines of the physical condition of 800 male and 360 female school

children expressed largely in the form of Tables ; but as the percentages are worked for single years in which the numbers are small these figures are not a very reliable gauge. One is surprised to find that just under half of the boys and over half of the girls harboured *Pediculus capitis*. The general state of nutrition was below the standard in nearly 50 per cent. ; this is ascribed to the poverty of the parents.

H. Harold Scott.

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## INDUSTRIAL HYGIENE.

ROBERTSON (D. G.). **Industrial Medical Service.**—*Med. Jl. Australia*. 1925. Mar. 28. 12th Year. Vol. 1. No. 13. pp. 303-309. With 5 figs.

In increasing numbers Australian industrial organizations are instituting systems of medical service for their employees, and it is essential that the medical profession and the employers interested should set before themselves clearly what a medical service should do and how this work should be undertaken. A questionnaire on the subject was addressed in November, 1924, by the Commonwealth Department of Health to the larger employers of labour throughout Australia, with the result that apparently, at the present time, forty medical men (seven full-time and thirty three part-time) are engaged on this class of work. In addition to medical men, at 23 establishments the full-time services of qualified nurses are engaged, at 10 others untrained nurses are employed, and 42 other companies report that persons qualified in first aid are employed.

An analysis of the duties required from the medical officers indicates strongly that the main purpose of an industrial health service, that is to say, the prevention of sickness, accidents and inefficiency amongst the employees, is lost sight of by many of the employers who have instituted the services.

The objects of an industrial health service are to improve the working conditions in the industry, to supervise the health of the workers, and to educate them in personal hygiene. These objects may be attained by the following, which are the duties of an Industrial Medical Practitioner.

### *Hygienic Supervision of the Plant.*

A close supervision should be exercised over all the working conditions. Every part of the establishment should be regularly inspected, particular regard being paid to the detection of anything likely to exercise an adverse influence on the health of the workers. Questions of ventilation, temperature, humidity, floor space per employee, the presence of harmful dusts, gases and fumes may require adjustment. Individual occupations should be studied as regards their monotony, concentration required and speed. The drinking water supply, adequacy of toilet, washing, and locker facilities should be noted.

### *Vocational Placement of Workers.*

The physical and temperamental requirements of the various occupations should be studied. By so doing the particular occupation for which any individual is suitable and the converse may be brought

to light. Mr. Henry Ford carried out extensive enquiry on these lines in his motor car factories. The result obtained was that there were 7,882 different kinds of jobs in the factory, of which 949 were classified as heavy work requiring practically perfect physique, 3,338 needed ordinary physical development and strength, and the remaining 3,595 jobs were proved to require no physical exertion and could be performed by the slightest and weakest of men. The lightest jobs were further classified, with the following results: 670 could be filled by legless men, 2,637 by one-legged men, 2 by armless men, 715 by one-armed men, and 10 by the blind. Therefore, out of 7,882 kinds of employment, 4,034, although some of them required strength, did not require full capacity. In other words, developed industry can provide wage work for a higher average of standard men than are ordinarily included in any normal community.

#### *Physical Examination of Workers.*

Employees may be examined on the following occasions and for the following reasons:—

1. *Prior to employment.*—Apart from Governmental or semi-Governmental departments and municipal undertakings it is not the custom in Australia for employers to require a physical examination before employment. When such examinations are required, however, the point is impressed that the object of them should be to determine the particular occupation for which the examinee is suitable rather than for the elimination of the physically unfit.

The Conference Board of Industrial Physicians of America recommend that the only applicants who should be rejected are those who are likely to be dangerous to themselves, to others, or to property.

2. *After absences due to sickness or injury not under observation.*—By such examination diseases may be found in their incipency when the prospects of successful treatment and cure are most favourable.

3. *When reporting sick during working hours.*—Where a full-time physician or nurse is employed it should be a rule that no employee leaves the works without having first consulted the physician or nurse.

4. *Apparent unsuitability for position occupied.*—In America, the Drayton Cash Register Company requires the foremen to place the employees under them into different grades according to the degree of satisfaction given in the performance of duties. Those in the lowest grades are sent for medical examination, and the medical director has placed it on record that physical defects responsible for the unsatisfactory performance of duties are found with extraordinary frequency. Appropriate treatment or the placing of workers in occupations more suited to their physical condition or mental capacity may produce a large percentage of useful workers from these previous misfits.

5. *As a guard against communicable disease.*—The object of such examination is evident; it is particularly necessary in the case of those handling food.

6. *In occupations dangerous to health.*—In Western Australia the law requires periodical examination of persons engaged in factories where lead or any poisonous compound of lead is used. Such examinations are not only of value in the detection of incipient cases of poisoning, but attention is directed to the particular process causing trouble, and employers are forced in self defence to take the necessary measures to remove or minimise these causes.

7. *Periodical health stock taking examinations.*—Although desirable, time seldom permits that every employee be periodically re-examined. It is a good rule, however, that the senior executive officers in the establishment be examined every twelve months, and that others in whom previous examinations have disclosed defects be seen.

#### *Health Maintenance.*

Industrial medical men should endeavour to instruct workers in personal hygiene by means of lectures, personal talks, articles in shop papers, and so forth. Questions of proper clothing, food, recreation, exercise, rest, prevention of communicable diseases, etc., should be dealt with. Attention should also be directed to the procurement and operation of facilities for rest, recreation and exercise to particular groups of workers requiring those benefits and the means of application should be indicated.

There are many influential factors causing ill-health that cannot be controlled within the place of work.

#### *Surgical and Medical Treatment.*

Treatment should be confined to first aid in the case of injuries sufficiently severe to cause absence from work, but all other injuries, whether sustained at work or not, should be treated until recovery. The prompt reporting of all injuries, no matter how trivial, is highly important, as by proper and early treatment numerous cases of septic poisoning are prevented.

Where the medical officer is only on part-time employment he should, if a nurse is engaged, indicate the general lines of treatment, and supervise it at the time of his visits. If no nurse is arranged for, he should ascertain that adequate first aid facilities are available.

Medical treatment should be afforded for all minor ailments, but the more severe conditions should be referred to the family physician, the case being, however, kept under observation. Where no nurse is engaged and the medical man is part-time, arrangements should be made for the attendance of employees desiring medical advice at certain definite times. Where a nurse is available she should be instructed to refer to the medical officer all whom she considers require medical attention. Where the occupation subjects the workers to risk from definite poison, as, for instance, in the lead industry, it is desirable that a stock of prophylactic medicines be maintained and that the employees be encouraged to take them regularly under supervision.

#### *General Duties.*

Where sociological departments exist the medical man should closely co-operate with them.

Sometimes workers are unable to obtain adequate medical, nursing or dental attention for themselves or their dependents, and the doctor, with his knowledge of medical men, hospitals, dentists, clinics and nursing societies, may be able to render valuable assistance.

#### *Instruction of Medical Personnel.*

Any nurses or first aid attendants engaged will need to be instructed in all matters connected with their duties. Classes for employees are also desirable and lectures on first aid should be given. Instructive pamphlets may be issued, especially detailing the necessary precautions against risks that are unavoidable, such, for instance, as occurs to workers in lead industries.

*Compilation of Records.*

Efficiency of the medical supervision is to be gauged by the amount of time lost through illness among the employees. Accurate records of the work performed and of the amounts of sickness and accidents are essentially valuable. Certain prescribed forms for the registration of records are prepared by the Statistician of the Commonwealth Department of Health; these are available on request to the Director-General of Health.

*Duties of an Industrial Nurse.*

In addition to duties in connection with the treatment of minor maladies and injuries under the supervision of the medical officer, the Industrial Nurse must exercise a general supervision over all matters affecting the health and well-being of the workers.

By visits to the various departments she should get to know the workers and seek to gain their confidence. The rest room or house ward should be entirely in her charge, for it is with girls attending these rooms that personal advice from the nurse is so valuable.

Under certain circumstances the nurse may, with advantage, give professional advice to employees absent from work through sickness, by means of home visiting. In such event, however, it is absolutely essential that any suspicion that she may be acting as a spy on the workers on behalf of the employer be quite out of the question.

An important duty is the keeping of records of persons treated and of the amount of sickness in the different departments.

*Accommodation for Medical Department.*

This will vary in accordance with the nature of the industry, workers employed, etc. Generally speaking, a surgery, consulting room, and a rest room will be found sufficient.

The surgery should be of sufficient size to permit of the maximum number of dressings being treated with speed and ease. A supply of hot and cold water should be available. Separate doors for entrance and for exit should be provided.

A consulting room is essential when physical examinations are made. It may also act as an office for the doctor and for the nurse.

A rest room furnished with couches and arm-chairs is desirable where women are employed. It should be a bright room, well lit and well ventilated. The nurse should keep a careful eye on all making use of the room.

Surgeries for the treatment of accidents have been provided in 54 establishments in Australia; in 24 others remedies are kept for medical treatment. In 10 establishments special rooms are provided furnished with one or more beds for the treatment of temporary indisposition, while in 46 others rest rooms are provided.

*Educational Courses in Industrial Hygiene.*

In the United States of America all medical schools providing courses in Public Health give 8 to 10 lectures on industrial hygiene and the more dangerous occupations.

At Harvard University special courses are arranged for medical practitioners who are interested in the subject. The following list details the subjects dealt with:—

(a) Industrial Medicine.

Industrial toxicology.

Clinical industrial medicine.

Industrial clinics.

(b) Industrial Medical Practice.

Industrial medical service ; including dispensary organisation, personnel, records, physical examinations, industrial psychiatry, health education.

(c) Factory Hygiene.

Ventilations, exhaust systems, humidity, dust determinations. Illumination. Photometric determinations.

Sanitary installations, rest rooms, etc.

Industrial seating.

(d) Industrial Operation.

Industrial organization and methods.

(e) Labour Legislation.

Workmen's compensation laws : women and children in industry.

(f) Field Investigation.

Visits to representative industrial and mercantile establishments for study and observation.

MAITLAND (Charles Titterton). **Phosphorus Poisoning in Match Factories in China with Brief Observations on the General Conditions of Labour found.** (Report to the Industrial Committee of the National Christian Council of China).—Reprinted from *China Jl. of Sci. & Arts*. 1925. Feb. & Mar. Vol. 3. Nos. 2-3. 20 pp.

The methods adopted in the enquiry were : (1) Correspondence with physicians and others likely to be in possession of the facts in all known centres of match manufacture ; (2) personal investigation in Shanghai, Pekin, Tientsin, Chefoo and Tsingtao.

From the first source of information replies were received dealing with 28 cities representing 120 match factories. Of this number, 25 factories used white phosphorus, 19 red phosphorus, 4 both the white and the red ; from the rest no detail as to the kind of phosphorus used was given.

The conclusions arrived at are as follows :—

1. There is evidence of the occurrence of cases of phosphorus necrosis of the jaw amongst match workers in China. For reasons that are not clear, it appears that the number of cases is relatively few compared with Western experience.

2. There are grounds for belief that match manufacturers of China intend to discontinue the use of white phosphorus at the end of 1924 in pursuance of the prohibition of the Pekin Government.

3. In the writer's judgment, the general conditions of labour in match factories have worked far more ill to the health of the workers than poisoning by white phosphorus.

A description is given of the four Dangerous Processes :—

1. Mixing. This takes place in ill-ventilated workplaces, and practically no effort is made to prevent the inhalation of phosphorus vapour by the workers.

2. Dipping. No attention is given to ventilation, and in consequence the vapour is inhaled during the necessary process of spreading the phosphorus paste preparatory to dipping the match sticks.

3. Drying. In certain cases the drying rooms, which are very hot and in which the atmosphere smells strongly of phosphorus, communicate with places in which other work is progressing without other means of ventilation.

4. **Boxing.** The filling is done by hand, with the result that they smell strongly of phosphorus after a period of work, and it is probable that an appreciable quantity of poison is ingested in eating with unwashed hands. The smell of phosphorus fills the air of the workroom for two reasons. This is partly because the dried matches still continue to give off vapour, and chiefly due to the accidental firing of matches by friction. This latter disengages heavy fumes of the oxides of phosphorus, with which the whole atmosphere of the room may be hazy.

In the boxing departments child labour is common, many children of from 5 to 6 years of age being employed ; they fill the boxes by hand with remarkable speed.

## REPORTS AND VITAL STATISTICS.

### NIGERIA. **Annual Medical and Sanitary Report, for the Year 1923.**

[ALEXANDER (D.), Director of Med. and San. Service.] 45 pp.  
1924. Lagos : Govt. Printer.

Amongst items of general interest in this Report note may be made of the following :—

Screening of houses against mosquitoes has been practically given up altogether, mainly on account of expense, but also partly because many occupants of completely screened houses complained of the diminished ventilation.

Owing to the rapid deterioration of vaccine-lymph when removed from cold storage, experiments were carried out to ascertain how the activity might best be preserved whilst in transit to out-stations, and whilst being used.

(1) The lymph, on receipt from England in steamer cold storage, is kept in cold storage at Lagos until issued for use in Lagos, when it is placed in a small cylindrical tin box, which is then wrapped up in cotton wool, placed in a wire bacteriological test-tube basket with a handle for hand transport. The whole is dipped in water occasionally to keep the cotton wool moist.

(2) Lymph for Ibadan and Kaduna was transported in an ice box by railway and issued for use as above described.

(3) For Kano and Katsina, the lymph was sent in the moist baskets from Kaduna to Kano by rail and to Katsina by runner, instructions being given to the runner to wet the cotton wool on each available occasion during the journey, and to hang the basket in the shade and, if possible, in a breeze during the rest periods.

(4) Vaccinators carried their supply of lymph in similar moist baskets.

(5) After the day's work the baskets were hung up in a shady place until required next day.

(6) All vaccinations were done in the shade.

(7) A group of vaccinations were carried out with the same batch of lymph at intervals of 2, 3, 6 and 10 days where possible, that is to say, a number was done :—

- |     |                 |  |
|-----|-----------------|--|
| (a) | At intervals of | 2 days.—1st, 3rd, 5th, 7th and 9th days. |
| (b) | " "             | 3 " 12th to 24th day.                    |
| (c) | " "             | 6 " 20th to 54th day.                    |
| (d) | " "             | 10 " 64th to 84th day.                   |

(8) As frequently a considerable number of those vaccinated cannot be found for inspection the percentage of success was calculated as a percentage of those actually inspected.

Where these baskets can be effectively used the result is an appreciable increase in the success rate, especially in the Northern areas, where the air is much drier. The general success rate in the Northern Provinces has risen from 32 per cent. in 1922 to nearly 53 per cent. in 1923, although the new conditions only operated in a few of the more important centres. In the Southern Provinces the results have not shown such a noticeable improvement. The question of a local vaccine institute has been under consideration, but for financial reasons had to be postponed.

Worm infestation is exceedingly common among the indigenous population, though apparently but little inconvenience seems to be caused in those affected. *Ascaris* infection is almost universal. Hookworm, according to different observers, ranges from 30 per cent. to 90 per cent.; as a rule, infestation is light among the peoples where food conditions are good. No hookworm campaign has been undertaken, and the sole measure against this widespread infection is such sanitary improvements as can be introduced through the Native Administrations, such as the Salga system (deep cess-pit) which has replaced the general use of a piece of "bush" ground as a latrine in certain of the towns.

**SIERRA LEONE. Annual Medical and Sanitary Report for the Year 1923.** [MAY (H. O'Hara), Acting Director, Med. & San. Services.] —88 pp. With 2 maps & 49 figs. 1924. Freetown: Govt. Printing Office.

The general health of both European and African officials was not so satisfactory as during 1922, although Freetown remained free from epidemics. Tuberculosis, especially amongst the Creoles, dysentery and venereal diseases all show a steady increase in the number treated. The death-rate increased from 26.3 in 1922 to 30 per 1,000 in the following year, and there seem to be no exact reasons for this, beyond the fact that there was a considerable increase in the number of deaths under three years. The infant mortality rate was 437 per 1,000 during the first year, but nearly half of these deaths occurred in the first month of life. The registration of births is still very incomplete and vital statistics for the Protectorate are not available, as registration of both births and deaths is permissive, and very few are registered.

The usual tables are given. It is noted that 474 persons were fined for having mosquito larvae on their premises.

There is an interesting report on the health of prisoners in Freetown gaol during the years 1913 to 1922 inclusive. The majority of all fatal cases among prisoners are admitted to hospital during the rainy season, and this seems to be correlated with the incidence of beriberi, the majority of the cases of this disease also being admitted during the season. The occupation of tailor definitely predisposes to fatal disease in Freetown Gaol, for of the total number of deaths during 1913 to 1922, namely, 213, no less than 72 (33 per cent.) occurred among the members of this trade, although their daily average strength was only about 15 per cent. of the total number of prisoners. The same predisposition is also shown in the case of beriberi. The higher death rate among the convicts is said to be due to this disease and



recommendations are put forward with regard to diet and conditions of work, in order to improve their general health.

Ankylostoma was found in 65.9 per cent. of the prisoners. Betanaphthol grs. 40 (in powder) followed in 1 hour by Thymol grs. 30 and Mist. Alba 4 ozs. after 4 hours, was the most successful form of treatment, whilst eucalyptus was a failure. *Filaria bancrofti* was found in 14.3 per cent., and *F. perstans* in 3.4 per cent. of the prisoners. The successful treatment of two cases of leprosy by injections of chaulmoogra oil is described in detail.

Professor BLACKLOCK and Dr. M. G. THOMPSON examined 100 rats collected in Freetown during January and February, 1923, and found the following number of fleas on them :—

Species and sex.	Total.	Number infested.	<i>X. brasiliensis.</i>	<i>X. cheopis.</i>
Black rat (male) ... ..	21	19	68	36
" " (female) ... ..	41	30	74	75
Brown rat (male) ... ..	17	15	185	87
" " (female) ... ..	21	19	92	37
Total ... ..	100	83	419	235

In addition to *Xenopsylla*, three examples of *Ctenocephalus canis* were found on the rats.

The main interest of the report, however, lies in Professor BLACKLOCK's account of his investigation into the prevalence of Goitre in the Protectorate of Sierra Leone, undertaken during the months of December, 1923, and January and February, 1924.

*Beriberi.* Experiments on fowls were undertaken to show what relative influence various factors exerted in the production of beriberi in the prison population. It was found that the rice supplied to the prison did not produce signs of polyneuritis after three months. When the water in which the rice had been boiled was discarded, evidence of definite effects was obtained and this effect was increased with prolonged cooking. Pounding the rice also had a very harmful effect, and is to be avoided. The presence or absence of sunlight seems to have no effect on the development of polyneuritis in fowls. Exercise, on the other hand, seems to produce very definite effects on fowls fed on a vitamin-deficient diet. In the first experiment all fowls deprived of exercise were dead within 17 days, whilst of those having free movements none died in less than 31 days. Of five fowls fed on polished rice and deprived of exercise, none lived longer than 26 days; whilst of another five similarly fed, all lived 38 days or longer when allowed free exercise.

This important observation shows that in any occupation which involves a sedentary habit, such as tailoring, mat-weaving, etc., any vitamin deficiency in the diet renders the person particularly liable to acquire beriberi.

Finally, mention should be made of the large number of excellent figures illustrating the whole report, amongst which those showing surface drains before and after canalization are of especial interest.

E. Hindle.

**GOLD COAST. Report on the Medical Department for the Period April, 1923-March, 1924.** [O'DEA (M. E.), Director, Med. and San. Services.]—49 pp. Accra : Govt. Printing Dept.

The report contains the usual account of health conditions and, as an appendix, the annual report of the Medical Research Institute

for the year 1923-24, by W. A. YOUNG, Acting Director, from which the following are abstracted :—

An inspection was made at Akuse (north from Addah) to Secondee, Takoradi, Tarquah, and up to Coomassie via Dunkwa; the type of country varies from big rain forest to orchard bush as one gets from the Colony to the Northern Territories. The species of tsetse-flies found present were *palpalis*, *longipalpis* and *tachinoides*.

It was noted that the state, as regards the tsetse in the part of Ashanti visited, was identical with that described by KINGHORN in the year 1910 (*Sleeping Sickness Bulletin*, Vols. 2 & 3). That is to say, the intensity of the fly has shown no increase during the past fourteen years, and, when the type of country and the climatic conditions are examined, it is seen that the tsetse fly just holds its own against the natural conditions, and no more. The reasons are considered to be :—

The banks of the rivers visited, *i.e.*, the Black Volta, the White, and the Volta proper, are thickly clothed with bush, which in most places overhangs the rivers. This means little room for movement of the flies and unsuitable places for game to drink. Here and there suitable places are found and here *palpalis* is present, and where there is high shade *tachinoides* also exists. *Longipalpis*, though not so dependent on water, is not found, however, where there is no water in a large radius.

The result is that on some treks of twenty miles, where no water was to be had, no *longipalpis* was seen. If, however, one stream was encountered, it was safe to expect *longipalpis* on that road, even though some miles from water.

During the dry season the orchard bush is barren of grass and leaves and devoid of water; consequently, there is no game and no flies are encountered. With the beginning of the rains and the forming of streams, the game spreads and the fly would appear to follow. These rivers, in the rains, rise many feet, and so a large number of pupae must be drowned.

The writer is under the impression that, as long as every human case of sleeping sickness could be isolated and cured, the fly is of no importance so far as human beings are concerned, beyond their biting irritation. Sporadic cases of the disease may, and probably do, get their infection from animals infected with *T. gambiense*, but anything of an epidemic nature that would occur here would undoubtedly be due to infection from man to man either directly or indirectly. Direct infection is a possibility, as trypanosomes taken up in the proboscis of a tsetse have been observed to be alive in the proboscis after half an hour.

As regards relapsing fever, the following conclusions are detailed :—

1. This first recorded outbreak of relapsing fever in British West Africa is due to a spirochaeta conveyed by lice.

2. As regards inoculation experiments, monkeys and black and white rats became infected with the strain, but do not relapse; guinea-pigs and rabbits are refractory, whilst the pouched rat becomes infected and relapses.

3. The vectors of the organism in the present epidemic and the inoculation experiments suggest that the parasite is not *Sp. duttoni*, but corresponds more closely to *Sp. recurrentis* (vel *obermeieri*), or a related strain.

4. Novarsenobillon is a specific in the treatment of the disease.

5. Immunity does not appear to be lasting or complete in cases treated with Novarsenobillon.

The kidneys of 100 rats were examined for the presence of *Leptospira icterohaemorrhagiae*, with negative results. The series included 75 *decumanus*, 11 *M. rattus* and 14 *Cricetomys gambianus*.

In the Report of the Analytical Chemist it is noted that no specimen of "native medicine" yet received with a "history" attached to it has been found to contain recognizable principles of either toxic or therapeutic value, toxicity tests being supplemented by experiment with animals.

**SIMPSON (William). Report to the Secretary of State for the Colonies on the Sanitary Condition of the Mines and Mining Villages in the Gold Coast Colony and Ashanti.**—32 pp. With 8 folding plans & 56 figs on 26 plates. 1925. Published by the Crown Agents for the Colonies.

The terms of reference were :—

"(1) To examine and to report to the Secretary of State on the sanitary condition of the Mines and Mining Villages in the Gold Coast Colony and Ashanti.

"(2) To enquire into and to report to the Secretary of State on the causes of the high mortality among the Native labourers, employed on the mines, particularly those recruited from the Northern Territories of the Gold Coast.

"(3) To report as to the remedial measures to be taken in these matters."

Until October, 1921, all the mines employed local labour from the surrounding villages ; since then, owing to scarcity in labour, a scheme of organized recruiting to supplement the local labour was originated. The labour by this system is principally derived from the Northern Territories of the Gold Coast. The period of engagement is for one year.

When this system of recruiting was started it was not realized that medical inspection in the Northern Territories was necessary to prevent unfit recruits being sent, nor was it thought essential to have some certificate of identification as a precaution that men who had been recruited were not changed on their way down country for others who were not fit.

The high death rate of the miners was partly due to the above absence of efficient organization, but among the additional causes the most important was the conditions favouring the presence of ankylostomiasis both in the mines themselves and in the mining villages. Unsatisfactory housing conditions in certain of the compounds, and in other locations a polluted and insufficient water supply and inadequate medical arrangements were contributory causes.

Death rates per 1,000 from April, 1923, to March, 1924, were as follows :—

	Mines.		
	Abbontiakoon.	Taquah and Abosso.	Prestea Block A.
All native labour ... ..	36.17	49.89	28.12
Northern Territory labourers	65.73	99.85	25.64

It is noted that the shortage of medical officers has a serious effect upon the health and economic interests of the country ; the scheme of an Auxiliary West African Medical Service locally trained is now being pushed forward.

"The remedial measures for the high death-rate in the mines resolve themselves into :—

"(a) Recruitment of healthy men for the mines.

"(b) Treatment of people in the mines and mine villages infected with ankylostomiasis.

"(c) Removal of insanitary conditions in the mines and mine villages.

"(d) Provision of adequate medical arrangements in Abbontiakoon, Taquah, Abosso and Nsuta Mines."

The recommendations made to ensure the above remedial measures are contained under twenty-two headings. They are for the most part those applicable to the prevention of ankylostomiasis, the proper examination of prospective employees and matters affecting the housing conditions, general sanitation and medical arrangements.

The bulk of the report is occupied with details relating to the individual mines and mining villages.

SIMPSON (William). **Report to the Secretary of State for the Colonies on the Outbreak of Plague in the Gold Coast Colony and Ashanti.**—17 pp. With 23 figs on 12 plates. 1925. Published by the Crown Agents for the Colonies.

In view of the position of the Gold Coast and its trade relations with countries infected with plague, its comparative freedom from the disease during many years may be considered fortunate. Some of the immunity of the Gold Coast during these years may be attributable to its not possessing any port with a harbour which admits vessels alongside its docks.

The first recognized cases of plague in Secondee were on 12th March, 1924 ; they occurred among Kroomen connected with shipping in the port. The disease spread in the area of the town chiefly occupied by these labourers, with the result that between March 12th and April 30th, 1924, 96 cases of plague (91 bubonic and 5 pneumonic) with 68 deaths, occurred. There was no evidence of an epizootic of plague amongst rats having occurred before the human cases. Inquiry resulted in the belief that sporadic cases of the disease had been present in Secondee before those recognized on March 12th.

In spite of precautionary measures against the spread of the infection, plague was reported at Coomassie by March 31st. Between this date and August 4th, 124 cases, with 110 deaths, were discovered.

By April 30th the disease appeared to have abated in Secondee, but on July 1st a recrudescence was evident, and between then and the 18th of the month, 24 deaths from pneumonic plague were discovered. This second outbreak was followed by infection of two villages along the coast line.

The conditions which render Secondee vulnerable to epidemic disease are given as :—

#### Conditions in the Port.

- (1) Secondee is at present the chief gateway to the interior of the

Gold Coast, and as such, its trading relations with Europe, America, and the different Colonies on the West Coast are considerable.

(2) There is no assistant medical officer specially deputed for duties in the port.

(3) There is no expert staff to carry on work in the laboratory for research and diagnosis and acting as sentinels against the importation and lodgement of disease.

Conditions in the Town.

(4) The homes of the Kroomen labourers who are intimately associated with the work of shipping and port are overcrowded and insanitary.

(5) The general housing condition of the town, especially in the congested areas, is most unsatisfactory.

(6) The method of disposal of refuse is bad.

(7) The headings in the register of deaths are defective and consequently fail to furnish early and valuable information to the Health Department.

Secondee is by no means efficiently equipped to prevent the importation of disease and it is essential to prevent further reinforcements entering from outside. With this end in view the following recommendations were made :—

(a) A European assistant medical officer for the port to visit all ships having any connection with the shore by passengers, labourers, sailors or cargo. Independent inquiry should be made systematically and regularly as regards the health on board the numerous ships, especially intercolonial trading ships, that call at the port. These inquiries should be made in addition, and quite apart from any made by the quarantine officer.

(b) Under direction of the assistant medical officer the European sanitary inspector should make a regular inspection of the bond and transit sheds and their surroundings, also of the canoes, cargo tenders and boats, and collect any rats for bacteriological examination that may have been trapped or killed, or have died.

(c) The sanitary inspector should also supervise the disinfection of any cargo from a suspected ship, and there should be installed on the jetty in suitable buildings Clayton, or other disinfectors.

(d) There should be registration of the labourers who work in the docks with their addresses, and the register should include those who remain on cargo boats. In this way regular inspection of their houses on shore is facilitated and absences from work owing to sickness can be checked. All cases of sickness should be reported to the assistant health officer.

(e) The laboratories at Secondee should be re-opened and permanent use made of them for the examination of rats, squirrels and other animals likely to be affected with plague; for the preparation of vaccines; for special bacteriological and entomological research; for assistance to the medical personnel in the town for the investigation and diagnosis of disease. A sufficient expert staff requires to be appointed to carry out these duties.

As regards conditions in the town, it is noted that much progress in development has been made since the last occasion on which Sir William Simpson visited it in 1908, but very little has been accomplished in the solution of the housing problem for the general African community. The result is that congested areas and slums exist which should never have been allowed to arise.

Good housing is one of the best safeguards against plague. Plots for huts should not be less than 50 ft. by 50 ft. ; plots for masonry houses for Africans should be 50 ft. by 75 or 100 ft., according to the size of house required. The sub-division of plots should not be allowed, and not more than one-half of the plot area should be covered by any hut or building.

Housing on the Gold Coast is a comparatively easy matter ; there is no large population, the towns are small, and there is abundance of land available. There should be greater powers to deal with dilapidated and insanitary houses, basing compensation on the value of the swish and of the corrugated iron on the roof, and on the understanding that a new site in the new-planned-out areas is offered on which a new hut can be built according to plan.

Certain of the wooden huts erected in Secoundee by the railway authorities for their European employees in the second class have not yet been vacated though originally they were only intended as temporary structures. They are not fit as dwellings for Europeans in a tropical climate ; moreover, some are badly sited close to malarial areas.

The housing and sanitation of labour camps on the railway and other constructional works require special attention.

In connection with the docks there is a good opportunity of making the new township of Takoradi a model town.

The central market at Secoundee is too small and is hemmed in by business houses ; a new market on a fresh site and designed on modern principles is needed.

The present method of refuse disposal by dumping in the lagoon is not at all satisfactory. Incinerators should be installed for refuse disposal.

The drainage of the town should be considered by an experienced sanitary engineer.

The outbreak of plague at Coomassie was serious in that the town is the terminus of two lines of railway, and is the main market centre not only for Ashanti, but for the Northern Territories. The town generally was in an insanitary condition, overcrowded in certain areas with huts and houses of bad design. A defective method of death registration made it impossible to discover in what part of the town a suspicious increase of deaths is noticeable.

The recommendations made included the following :—

(1) That the Accra form " B " of Register of Deaths should be at once used, but with the addition of columns showing address in station, name and number of street, name of district, and occupation of deceased.

(2) A duplicate register should be kept at the burial ground by a reliable resident man, who should live in a hut built at the entrance of the ground. This man should be given a sufficient staff to keep the burial ground in a sanitary condition.

(3) That a sufficiency of temporary structures should be immediately provided for the strict medical supervision of contacts, so that *all* residents in the compound, and if need be, all residents in neighbouring compounds, may be removed, isolated and inoculated in the event of plague. While accommodated in these structures the compound houses should be dealt with.

(4) If the compound houses are not fit for the occupiers to return after 12 days, then they must go into temporary camp, such as now is

erected for people whose huts have been destroyed. They would be able to work during the day, returning to the camp at night.

(5) The infected compound should have all its rooms claytonized or disinfected with cyanide, the latter being carried out by a European. Adequate steps are necessary to ensure proper treatment during fumigation.

(6) There should be a house-to-house inspection of the whole town. The inspection of infected areas beginning on the outskirts and proceeding to the centre. The inspection should take note of all necessary matters in connection with plague, and records should be kept of the findings.

(7) Three more medical men and four more European sanitary inspectors are required to carry out the above recommendations.

(8) A plan of the town should be made showing the position and date of cases of the disease; the localities and dates of finding infected rats should also be noted.

(9) All food stores should be inspected and rats in them should be sent for examination.

(10) In order to be ready to evacuate an area which is badly infected, a camp should be prepared, either of bush huts or tents or both. This camp is in addition to those suggested in (3) and (4) above.

(11) It should be the duty of all medical men to report to the health authorities any suspicious case they may attend.

**COLOMBO, MUNICIPALITY OF. Report of the Medical Officer of Health for the Year 1923.** [ASERAPPA (C. V.), Acting M.O.H.]—pp. 50. With 9 charts and 4 maps. 1923. Colombo: Municipal Printing Office.

The report contains the usual account of the health conditions and general sanitary state of the city, and includes charts, maps and tabular statements. The health of the city, as gauged by the amount of sickness and mortality, was not satisfactory. The crude death-rate was 35.5, as against 31.1 per 1,000 in the preceding year, and 29.8, the average for the preceding 10 years. The rates are fallacious as they are calculated on a population figure very much below the real. At the time of the last census Colombo had not fully recovered from the effects of the war and a great part of the large immigrant population had not returned.

The reports of the City Bacteriologist, Dr. L. Fabian HIRST, which are annexed to the main report, will be found to be of general interest.

Investigations on the control of hookworm disease form the subject of one of these special reports, resulting from an outbreak of the disease occurring amongst a gang of coolies who had been engaged in clearing out the sludge from the sump at a sewage pumping station. Investigations were conducted on various aspects of the life of the worm, including egg output, egg hatching, larval growth and activities, and larval life.

Amongst the conclusions arrived at are the following:—

(a) The labour force engaged in clearing sumps and sewers are exposed to grave risk of contracting hookworm disease. The sumps of pumping stations should be emptied as far as possible by mechanical means. Coolies should not enter the sumps or sewers without adequate protection for their feet and hands.

(b) Hookworm larvae are capable of ascending a considerable distance through loose soils. Hookworm infected faeces cannot be buried in such soil without risk of infecting the surface of the ground.

(c) Hookworm larvae cultured in soils rich in organic matter can survive at least four months in typical Colombo soils.

(d) The sludge from the septic tanks can be safely sold as manure after being thoroughly sun-dried and kept in dry store for six months.

(e) The reconstruction carried out on the septic tanks has not only improved the effluent chemically and physically, but it has diminished the risk of hookworm larvae passing out with the effluent or sludge.

The second report of the City Bacteriologist, which is of general interest, concerns plague. It is clear that the distribution of *X. cheopis* within the city boundaries is correlated with the distribution of both human and rat plague, and with the storage of imported produce. Approximately 75 per cent. of the fleas caught on rats from the Customs premises and Government granaries are *X. cheopis*. A severe epizootic of plague occurred amongst these rats in the month of May. Where sporadic cases of plague, or temporary foci of cheopis, occur elsewhere outside the endemic zone, it usually transpires that grain or forage has recently been imported into the neighbourhood from the plague zone.

The indigenous flea is *X. astia*. Over 98 per cent. of the fleas in plague-free districts belong to this species.

In last year's report a suggestion was made that *astia* might be able to carry at up-country ranges of temperature, and a series of transmission experiments were in progress with the special object of testing the power of *astia* to transmit plague at temperatures below those prevalent in Colombo. The experiment had just been made (1924) of keeping infected fleas at a temperature of 70-75° F. in an ice box. A positive result was obtained with 1 out of 68 infected *astia*; 2 out of the 3 rats bitten by this blocked *astia* died of plague. All attempts to transmit the disease from rat to rat by means of *X. astia* under the most favourable climatic conditions met with in Colombo have been entirely negative. On the other hand, successful transmissions with *X. cheopis* have more than once been obtained.

It is now clear that cheopis is a much more efficient vector of plague than *astia* under conditions that are not specially favourable to the spread of the disease. A comparison of the results of the Bombay (TAYLOR and CHITRE 1922-23) and Colombo experiments supports the conclusion that the power of cheopis to transmit plague is less affected by climatic conditions than *astia*.

It is interesting to note that F. W. CRAGG, in a further report on his rat flea survey of India obtained a coefficient of correlation of 0.879, probable error 0.057, between cheopis and plague, for a group of Indian ports including Bombay, Karachi, Madras city, and Rangoon, but a coefficient of only 0.250, probable error 0.198, for the Punjab. This result is in accord with the suggestions with regard to the effect of climate upon *astia*.

The theory that cheopis has a special relation to plague and, consequently, that the species distribution of rat fleas has great practical importance is gaining ground in many quarters.

**AIR MINISTRY. Report on the Health of the Royal Air Force for the Year 1923.** [MUNRO (D.), Director of Medical Services, R.A.F.]—pp. iv+71. With 4 charts. 1925. Feb. Air Publication 1103. London: H.M. Stationery Office. [Price 3s. 6d. net.]

This report does not need much comment from our standpoint. The Force abroad is distributed in the Mediterranean Littoral (Malta, Egypt, and Palestine), Iraq, and India. The main diseases affecting



the Force in these regions are sandfly fever, malaria and dysentery. Sandfly fever is prevalent in the summer and autumn (May or June to October, inclusive), but in India cases occurred in all months excepting February and December; the ratio of cases per 1,000 per annum in 1923 was, for the Mediterranean (Malta), 137.2, Egypt and Palestine, 97.6; for Iraq, 301.6; for India, 25.8. Malaria is particularly prevalent from June or July to November, inclusive; the ratio of cases per 1,000 per annum was, for the whole Mediterranean, 26.5; for Iraq, 151.2; for India, 202. Dysentery is distributed through the greater part of the year, but with increased incidence from May or June to November; the ratio of cases per 1,000 was, for the Mediterranean, 15.3; for Iraq, 30.6; for India, 17.9. In all regions together there were, during 1923, 20 cases of typhoid with 3 deaths, 6 cases of paratyphoid A, and 7 cases of paratyphoid B. There were 3 cases of heat-stroke—2 in Iraq and 1 in Transjordan— with 1 death.

There are laboratories abroad, at Ludd, Hinaidi, and Basrah, besides those at the R.A.F. Hospitals at home and the home Central Laboratory. At the last-named institution investigations were continued on *Phlebotomus papatasi* and sandfly fever; an opportunity occurred here of testing the susceptibility of *P. papatasi* to the infection of Oriental sore, and the experiments were negative.

A. A.

FERNÓS ISERN (A.). **Mortalidad infantil en Puerto Rico.**—*Bol. Asoc. Med. de Puerto Rico*. 1925. Apr. Vol. 19. No. 148. pp. 26-31.

Infantile mortality in Porto Rico is very high. In 1923-24 the rate was 128 per 1,000 births, and this was lower than in any of the preceding five years. During 1923-24 there were 6,642 deaths in the first year of life, and of these, 2,217 were ascribed to gastro-intestinal disorders, 1,814 to marasmus, and 1,092 to respiratory conditions, including tuberculosis. The large number of gastro-intestinal disorders of infancy is ascribed to the prevalent idea that breast-feeding is insufficient for nutrition. Tetanus was accountable for 503 deaths, although expectant mothers and midwives are provided with "prophylactic packets." Inquiry showed that these were very rarely used. As large a proportion as 108.9 per 100,000 are registered as due to rickets. The author thinks that this is a grave error, and that under this term are included many cases of marasmus, inherited syphilis and tuberculosis.

The Health Department are making great efforts to overcome this huge mortality by establishing prenatal centres, infantile clinics, visiting nurses, and venereal and tuberculosis clinics.

H. Harold Scott.

SUZUKI (T.). **Special Causes of Infant Mortality in Dairen.**—*Jl. Oriental Med.* 1924. Aug. Vol. 2. No. 3. pp. 239-245.

The statistics given in the article are the result of six years scientific research in the clinic of the author, dealing with over 35,000 cases relating to diseases widely distributed over Dairen and its suburbs. Of the above number of cases treated 1,775 died; of these 789 were children whose ages were under one year.

The general conclusions are as follows :—

1. The specific causes of infant mortality in Dairen are as follows :

Influenza, beriberi, enteritis, measles, broncho-pneumonia, whooping-cough.

2. The following five systems of diseases are the principal causes of infant mortality in Dairen: (a) General diseases; (b) digestive system; (c) respiratory system; (d) nervous system; (e) congenital debility.

3. Infantile mortality is highest in March. In autumn, infant deaths are fewest. In winter infant deaths are caused by influenza and broncho-pneumonia. In spring measles may be added to the above. At the end of spring enteritis begins, reaching its maximum in summertime, in which period whooping-cough and beriberi are added. Beriberi continues until early autumn and from then infant mortality declines.

4. As regards age incidence. During the first and second months of life infantile beriberi and pneumonia are most prevalent, and again in the tenth and eleventh months. During weaning infant enteritis and measles are most prevalent.

5. Specific causes of deaths in the newly-born are as detailed below in order of importance, but congenital debility is peculiar to these times. (a) Influenza and infantile beriberi; (b) congenital debility; (c) premature birth; (d) broncho-pneumonia; (e) encephalitis.

**ÉMILY.** *Note au sujet de l'état sanitaire des contingents indigènes du corps d'armée colonial pendant l'année 1923.*—*Ann. de Méd. et de Pharm. Colon.* 1924. Sept.-Oct.-Nov.-Dec. Vol. 22. No. 3. pp. 377-395. With 2 figs.

This note apparently relates to colonial contingents serving in Europe in 1923. In a force of 8,230 Senegalese, 250 deaths occurred and 351 repatriations; of the deaths, 39·6 per cent. were from pulmonary affections, and 46 per cent. from tuberculosis, and of the repatriations 23·5 per cent. were for lung trouble and tuberculosis, and 53 per cent. for debility, pointing towards tuberculosis. In a force of 6,136 Malagasies the deaths were 120 and the repatriations 280; pulmonary affections accounted for 32·5 per cent., and tuberculosis for 33·35 per cent. of the deaths, and tuberculosis and pulmonary affections for 30 per cent., and debility with predisposition to tuberculosis for 52·5 per cent. of the repatriations. In a force of 3,368 Indo-Chinese the number of deaths was 48, and of repatriations 147; 18·75 per cent. of the deaths were from pulmonary affections, and 33·85 per cent. from tuberculosis; 34·7 per cent. of the repatriations were for tuberculosis and pulmonary complaints, and 43·55 per cent. for debility predisposing to tuberculosis. Next to the affections of the respiratory organs—which were, however, less numerous than in the previous year—came venereal diseases, gastro-intestinal diseases, and skin diseases. Epidemics of chickenpox and mumps occurred among all the contingents.

A. A.

#### MISCELLANEOUS.

**HEALTH.** Melbourne. 1925. Mar. Vol. 3. No. 2. pp. 48-51. With 2 text figs. **The Commonwealth Health Laboratories. Standard Plan of the Laboratories.**

The object of these laboratories is to supply country centres which have no laboratory facilities with the necessary staff, equipment, and

buildings to enable the diagnostic, public health, and investigational work of the district to be carried out.

A "type plan" of the standard laboratories which have already been erected at a number of centres in Australia is here reproduced :—

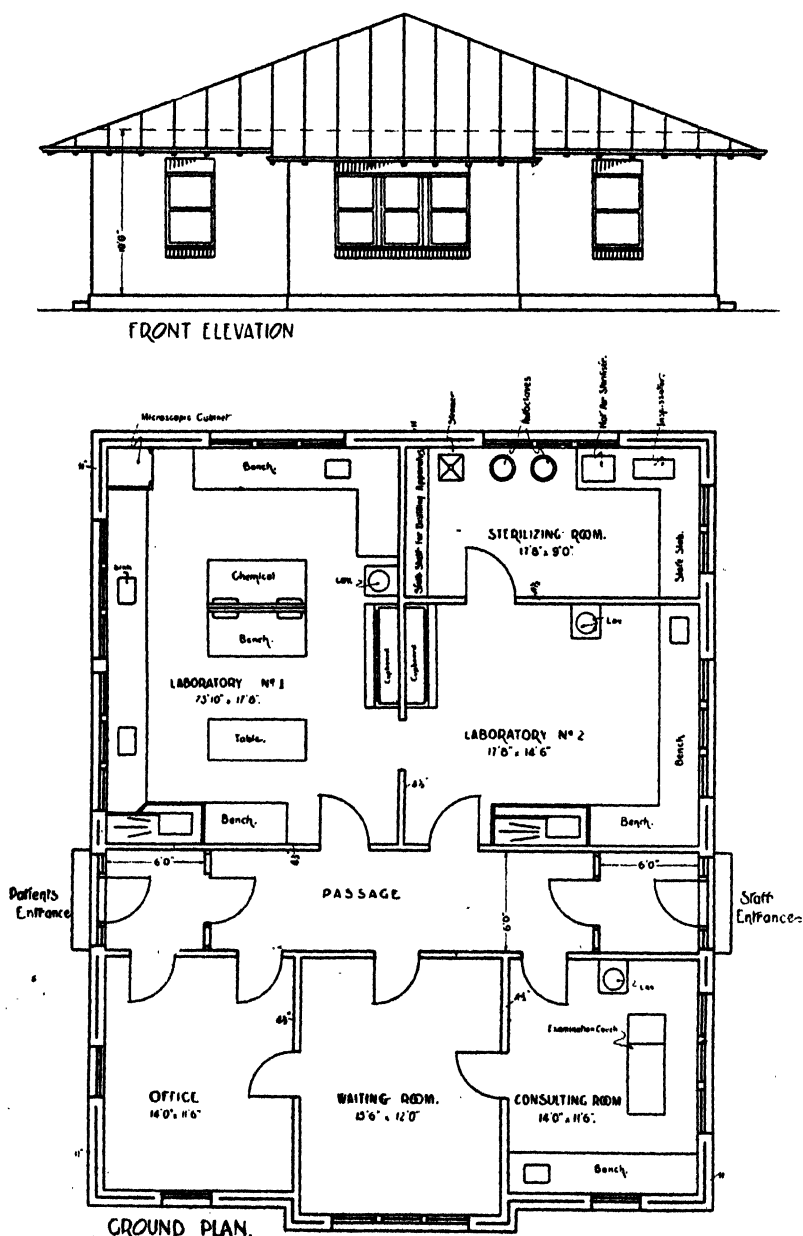


FIG. 46.—A "type plan" of the standard laboratories erected in a number of country centres in Australia.

[Reproduced from "Health," Melbourne.]

In connection with each laboratory provision is made for a main building which contains laboratory rooms and offices, and also for an animal house, the latter being an essential in modern bacteriological work. A "type plan" of an animal house is also reproduced:—

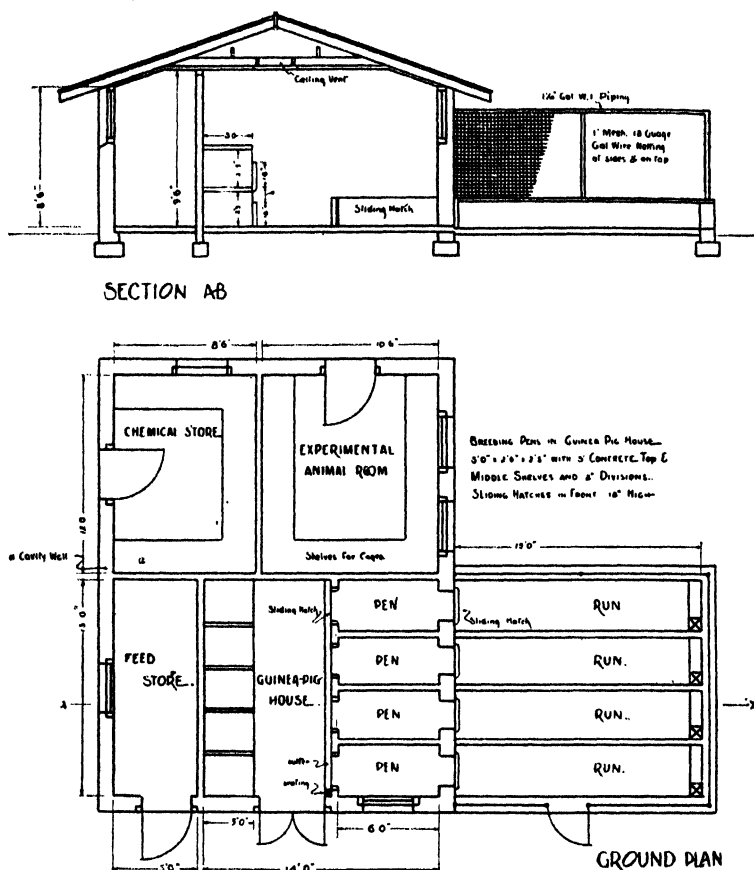


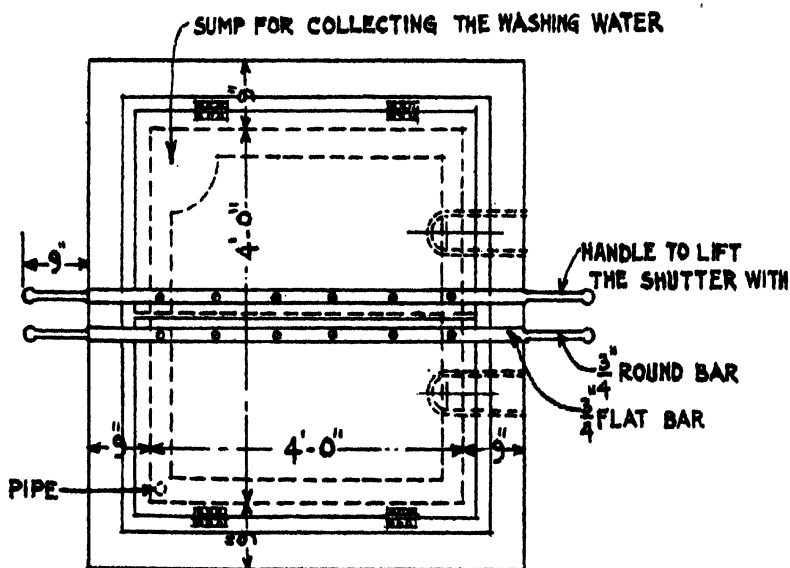
FIG. 47.—A "type plan" of the animal houses provided in connexion with the standard laboratories in Australia.

[Reproduced from "Health," Melbourne.]

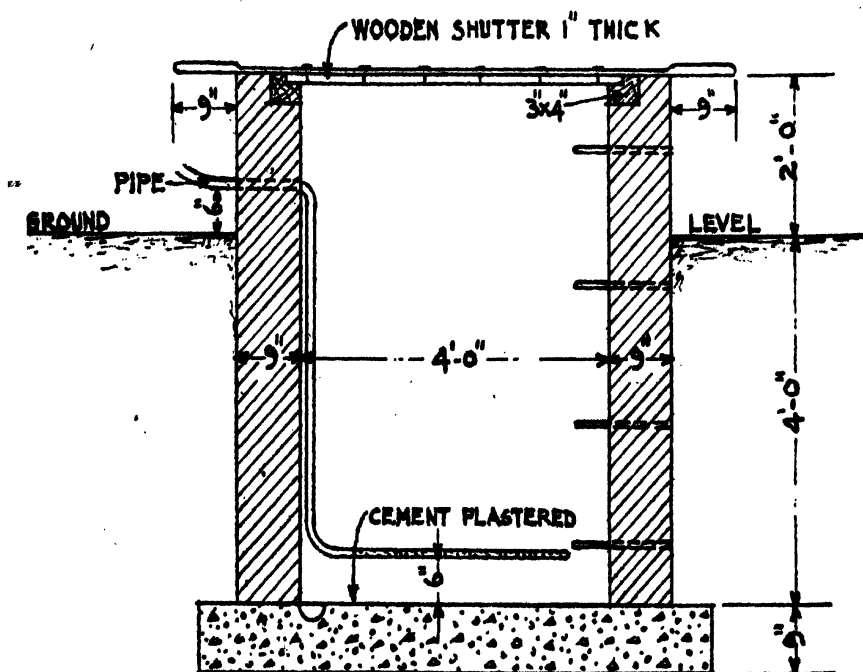
The dimensions and arrangements are illustrated on the plans. The points attended to are: (1) Good lighting, both natural and artificial; ample window space with the bottoms of the windows on a level with the benches. (2) The provision of a microscope cabinet with a roll door and a "dead" black interior securing a minimum of eye strain, and uniform light. (3) Liberal provision of bench space, gas and water points are great conveniences, and provide for increase in working staff, if necessary.

**MADRAS.** Local Self-Government Dept. (Public Health) G.O. No. 1561, P.H., 30th Oct., 1924. 3 pp.—**Type-design.—Lethal Chamber for the Destruction of Dogs.**

"The chamber will be simply a cistern with masonry walls and cement-plastered concrete floor. The top will be covered with hinged



PLAN.



SECTION

FIG. 48.—Type design of a lethal chamber for the destruction of dogs.  
[Madras Public Health Board type design No. 192.]

wooden shutters. The chamber will measure 4 ft. by 4 ft. and 6 ft. deep, of which 4 ft. will be below ground, and 2 ft. above.

"A lead pipe will be taken down one corner and then round the four sides at 6 in. above floor level. The portion of the pipe round the bottom of the tank will be perforated with  $\frac{1}{4}$  in. diameter holes spaced about 1 in. apart.

"When the chamber is required for use, the lead pipe above ground will be connected to a cylinder of carbon-dioxide, and the gas turned on. The gas, being heavier than air, will flow down the pipe and escape into the pit through the perforations in the pipe. The level of gas in the pit should from time to time be tested by a lighted candle, and when the pit is full the supply of gas should be shut off and the pit allowed to remain undisturbed for about half an hour.

"The animals to be destroyed will, first of all, have a simple tape muzzle put on. They will then be led one at a time to the edge of the pit, one shutter will then be opened, and the animal lifted by putting the hands under the chest and raising on to the hind legs, which are then slipped over the edge, and the animal quickly lowered, a wide collar being used to prevent any injury to the neck. The shutter is then quickly closed. The animal will become unconscious in from 10 to 15 seconds and life will become extinct in from  $2\frac{1}{2}$  to 3 minutes.

"The inside of the pit should be plastered with cement and the bottom sloped to a sump in one corner to collect water when the pit is cleaned and washed. In ordinary use the bottom of the pit might be covered with 3 in. of dry sand to facilitate cleaning.

"The foot-rests may be omitted if a separate ladder is kept available for the purpose of entering the chamber for cleaning purposes.

"Care must be taken to see that the gas has all gone from the chamber before any person enters it to remove the dogs or for cleaning it."

MEGAW (J. W. D.). **On the Importance of keeping Cool.**—*Indian Med. Gaz.* 1924. Nov. Vol. 59. No. 11. pp. 572–575. With 2 diagrams.

The insidious wastage of human life and effort caused by high air temperature in the tropics, the author writes, has not yet been seriously studied. He suggests that one of the effects of prolonged exposure to heat is to beget a fatalistic attitude towards health and comfort. Apart from the electric fan little has been done to counteract the effect of excessive heat. The problem of keeping the air of a house cool is not easy; methods suitable for the dry heat of the Punjab are useless in the moist heat of Calcutta or Bombay. One can keep cool at night by taking advantage of the fact that the air outside is cooler than the air within, but in daytime in Calcutta or Bombay artificial air cooling is a necessity. An installation for this purpose has been in use with satisfactory results for three years at the Calcutta School of Tropical Medicine, and is here figured.

"The room is insulated, and is supplied with air which is passed over the coils of an ammonia refrigerating plant. The same fan is used for forcing the cool air into the room and for extracting the air from the room. Extra fresh air can be introduced into the circuit in any desired quantity to ensure good ventilation. The diagram shows the main features of the installation.

"The advantages of this system are:—

"(1) The air of the room can be maintained at a suitable temperature, irrespective of the climatic conditions.

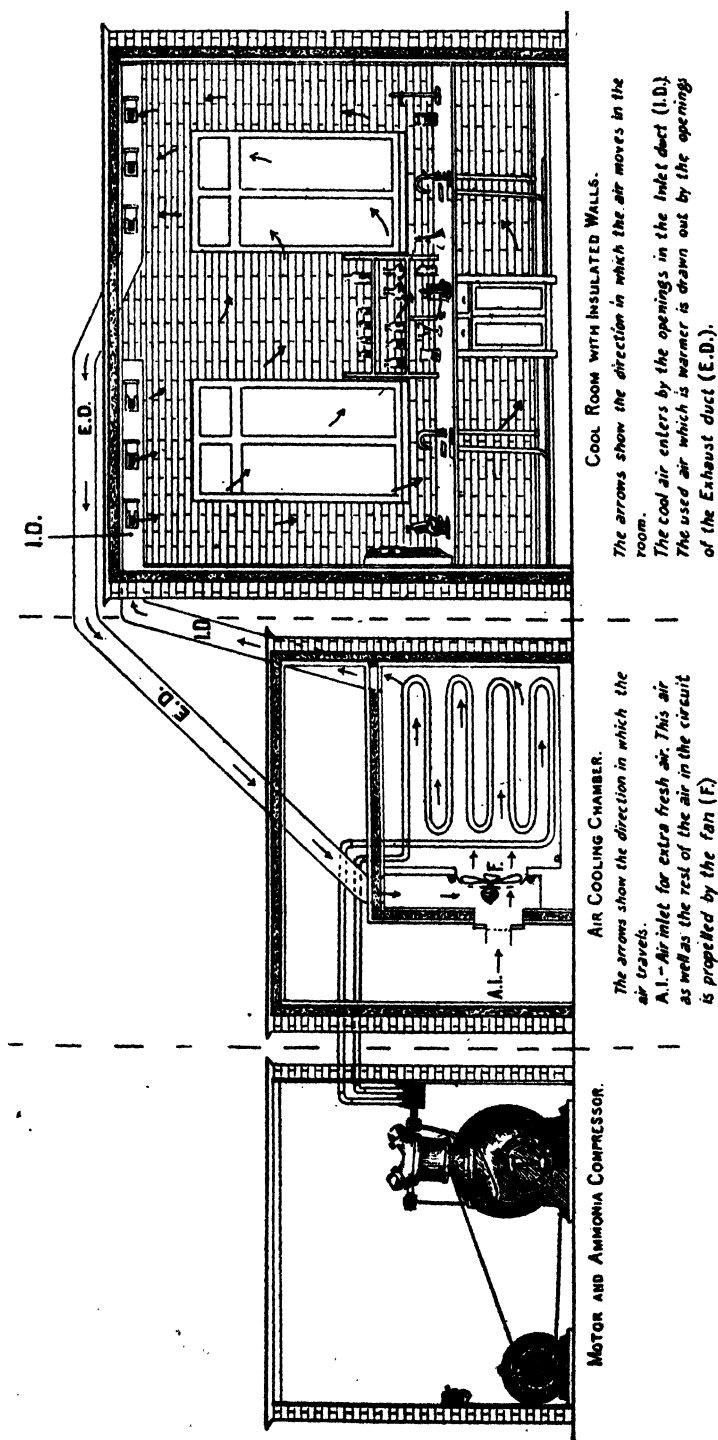


FIG. 49.—Diagram of installation for artificial air cooling of a room at the Calcutta School of Tropical Medicine.

[Reproduced from the Indian Medical Gazette.]

"(2) The air of the room can be kept as dry as is desired.

"(3) The room is well lighted and well ventilated.

"(4) The air can easily be made dust proof and insect proof by filtering the inlet air over cotton wool."

In Calcutta the cost is not great because the system is connected with the cold storage plant. For suites of offices the cost of cooling for each person would work out at about 100 rupees a month. Such offices would be smaller than those of to-day, so that there would be a saving in space, and hence in cost of building. On the other hand, there would be increased mental efficiency, improved health, less need for expensive holidays, and a capacity for work after the normal time for retirement.

In the Punjab in the dry heat of the summer months advantage can be taken of the cooling caused by evaporation of water. The

Diagram II.

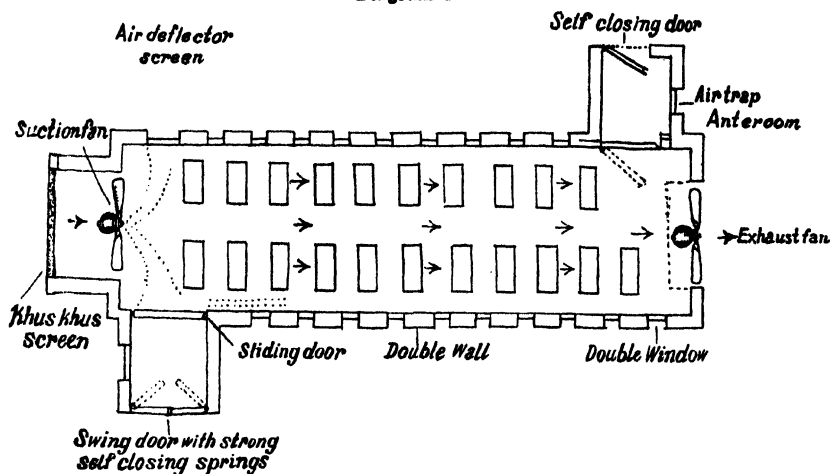


FIG. 50.—Diagram of hospital ward with damp khuskhus screen through which air is sucked by a large fan. An exhaust fan at the opposite end of the ward, working at the same speed, ensures a slowly moving column of cool air.

[Reproduced from the *Indian Medical Gazette*.]

diagram of a hospital ward explains itself. In the cold weather the windows could be opened wide, or the verandahs used. For railway trains the same system of cooling could be adopted; the train's movement replacing the fan.

Other means of mitigating the "rigours of the tropics" are: (1) The underground room furnished with electric fans; (2) the whitewashing of roofs and walls on the outside [see GRABHAM; this *Bulletin*, Vol. 18, p. 274]; (3) double roofs with provision for air circulation between, the roofs extending well beyond the walls, which should also be hollow; (4) improved construction of fans, to admit of their regulation in position and direction (fans are usually fixed so as to send down a current of hot air from the top of the room); (5) removable roofs for places of amusement.

A. G. B.



## BOOK REVIEWS.

DUKES (Cuthbert) [M.D., M.Sc., D.P.H., Lecturer in Bacteriology, King's College for Women, Pathologist to St. Mark's Hospital, etc.] **The Bacteriology of Food.**—pp. x+180. With 25 illustrations. 1925. London: H. K. Lewis & Co. Ltd. [Price 7s. 6d. net.]

This little book, designed to meet the special needs of students preparing for the final examination in Bacteriology for the degree of B.Sc., London University, not only worthily fulfils its purpose, but achieves a much greater usefulness, and may well find a place on the bookshelf of every specializing bacteriologist. The matter embraced within its small compass includes concise descriptions of the methods employed in the examination of water, milk and solid foods for the detection of bacteria which spoil the food or cause disease. The purification of drinking water, and the preservation of food by sterilizing, heating, canning, freezing, chilling, salting and desiccation are very fully dealt with. A lengthy section on milk forms one of the most valuable features. It discusses milk as a vehicle of disease and deals with the source and nature of micro-organisms, causing deterioration of milk. The author is strong in his condemnation of certain insanitary methods employed in the collection of milk, and puts forward many useful suggestions for the ensurance of a cleaner milk supply.

Passing from the micro-organisms of harmful import, the author gives a very interesting account of those bacteria and fungi of economic value which are used in the preparation of the different kinds of cheese and fermented milks, the leavening of bread and the fermentation of alcoholic beverages.

The important subject of "food poisoning" receives adequate consideration in the concluding chapter, and the work is completed by a very useful appendix on culture media and stains.

The book contains a great deal of important matter not found in text books on general bacteriology. It is written in a very lucid style, and the author has succeeded in rendering a highly technical subject not only intelligible, but interesting to the general reader, without introducing any of the defects of the "popular" work.

The illustrations are clear, and the quality of the typography, paper and binding reflects credit on the publishers.

J. T. Duncan.

ATKINSON (R. C. Everitt) [M.A., M.D., D.P.H., Commissioner of Public Health, Western Australia]. **Hygiene Jingles.**—48 pp. 1924. Adelaide: Hospital Electrical & Radium, Ltd., British Medical Association Building, Hindmarsh Square.

These "jingles" are meant "to fill a gap in the education of the young," their design being to combine, in one harmonious (if not melodious) scheme, instruction in the elementary principles of hygiene, and in the art of versification. Their author expresses no uncertain opinion as to their value: if a child "learn these jingles by heart and endeavour to practise what they preach, he will have an easier passage [through life] than ever the most beauteous gem of the classics can give him."

Regarding them from the hygiene standpoint their chief defect is that, although they have a semblance of being explanatory, so many of the things and terms of which the relations are explained must, to a child's mind, remain mere chimaeras. What, for instance, is a child to make of:—

"And last, the triple Vitamins, we're told  
New principles in dieting unfold;  
For Science says that "A," and "B" and "C"  
Food factors are, required by you and me."

Their valuation as verse is beyond the scope of this *Bulletin*, and the following stanza is quoted for the sake of its last line, which shows that, notwithstanding his confident introductory statement, the author knows the weakness of his position and understands that knowledge is only *one* of many conditions that conduce to right action either in the ordinary affairs of life or in technical affairs, such as hygiene :—

“ All babies need a lot of love and care,  
Hence many die, who never really ought :  
We lose these jewels, far beyond compare,  
'Cos parents will not practise what they're taught.”

Ay, there's the rub ; parents and others will not practise what they're taught, whether the preaching be to the accompaniment of the pealing organ and full-voiced choir, or of the exalted tambourine. The author has forgotten Dr. Isaac Watts's hymns.

A. Alcock.

ST. JOHN AMBULANCE. **Manual for the Use of Schools Training for the Mackenzie School Certificate in St. John Ambulance. Anatomy, Physiology, First Aid, Hygiene & Sanitation.** [WATERS (H. G.), Chief Medical Officer, F.I. Railway.]—37 pp. with 1 folding fig. 1923. Allahabad : Pioneer Press. [Price 2 annas.]

ST. JOHN AMBULANCE. **Handbook for the Use of Teachers' Training Classes for the Mackenzie School Certificate in St. John Ambulance. Anatomy, Physiology, First Aid, Hygiene & Sanitation.** [WATERS (H. G.), Chief Medical Officer, F.I. Railway.] 2nd ed. pp. vii+iii+113. With 26 text figs, 2 folding plans & 1 folding diagram. 1924. Allahabad : Pioneer Press. [Price 1 rupee.]

These books survey much the same ground, from different altitudes of vision. They appear to be sufficient for their purpose. In the “ Handbook ” for teachers one would prefer to see anatomy treated less as dry bones and more as anatomical topography, and physiology more as vital processes and purposes than as a descriptive catalogue of viscera. The section on hygiene and sanitation in the “ Handbook ” is remarkably good, though there is some deficiency in the important matter of food and diet.

A. Alcock.



TROPICAL DISEASES BUREAU.

**SANITATION SUPPLEMENTS.**

OF THE

**TROPICAL DISEASES BULLETIN.****APPLIED HYGIENE IN THE TROPICS.**

By LT.-COLONEL G. E. F. STAMMERS, O.B.E., R.A.M.C. (retd.)

SUPPLEMENT No. 3.]

1925.

[OCTOBER 30.

## ERRATUM.

*Sanitation Supplement* No. 1, 1925, p. 64, lines 9 and 10. The birth rate and death rate for Mauritius for the year 1923 should read 36·8 and 28·5 *per mille* respectively, instead of *per cent*.

## DISEASE PREVENTION.

HOPE (E. W.). **Some Considerations in Regard to the International Aspect of Quarantine Regulations.**—*Jl. State Med.* 1924. Dec. Vol. 32. No. 12. pp. 551-555.

English Quarantine legislation is less restrictive than that of any other country, and it has been criticized as being due partly to the pressure of powerful commercial interests in the country and partly to a national tendency to a policy of *laissez faire*. Both of these criticisms can be refuted, for we do all that is necessary and practicable in the present state of knowledge to protect the public health of our own country from the importation of dangerous epidemic disease. The public health organization of the country is such that we are enabled when necessary to keep in touch with both passengers and crew which have been landed and have proceeded to the interior from abroad, thus avoiding the necessity for detention at our ports. It is not suggested that every country should adopt our procedure and no more, but it is strongly urged that quarantine restrictions should be exactly in proportion to the dangers that exist, in fact and not in theory. Quarantine legislation should also be protective and not aggressive.

The opinion is expressed that quarantine regulations should not be considered as a source of revenue; the very most that should be derived in fees should no more than cover the cost of the service. In England ships of any nationality infected with plague, cholera or yellow fever

are dealt with at the expense of the country and not of the ship; no charges are made for medical inspection of vessels on arrival or for disinfection after infectious disease. In fact the Port Sanitary Authorities derive no revenue whatever directly from shipping, whether our own or that of a foreign country.

Bills of health appear to be almost an unnecessary legacy of the past. In these days of rapid transit it seems strange that a vessel should be required to carry a record of the state of health existing at the various ports of call, when other means equally reliable and far more rapid are available as sources of information. Information of the existence of dangerous epidemic disease in a port of departure is really required in advance of the arrival of the ship from that port. It would seem better to do as is done between the ports of our own country—viz., the last port of call should notify the next port of call that such and such an infectious disease has occurred on such and such a vessel.

Another problem is the fumigation of ships for rat destruction, which is a health measure of first importance. There is no doubt that many fumigations practised in various parts of the world can only be described as a farce. There are many points in favour of the periodical fumigation of ships at regular intervals of six months which is demanded by some countries, but it is a grape-shot method of attack, lacking the precision that modern scientific methods aim to achieve. In the United Kingdom, vessels are fumigated if there is the slightest suspicion of rodent plague on board; for the rest fumigation is ordered when there is evidence that the rats on board are numerous. In Liverpool the necessity for fumigation is based upon the reports of the rat-catchers and rat-searchers who are specially trained to examine ships and to report on the degree of rat infestation. This, combined with efforts to prevent the passage of rats from the ship to the shore, and the elimination of rat harbourage on the quays, gives very satisfactory results. Its success depends upon a skilled and trained staff which is trustworthy, and it is at least a more rational procedure than placing complete confidence in routine fumigation of all ships every six months, and of every ship from a plague infected port, regardless of any other consideration.

Lastly, in many countries vessels are not inspected except between sunrise and sunset, and so are detained if they arrive during the night. Nowadays when almost every ship is fitted with electric light it is always possible to obtain sufficient illumination for a thorough medical examination, and it appears unreasonable that a healthy ship should be detained until daylight before being medically inspected. In England, medical inspection is carried out by day or by night as soon as possible after arrival of the ship.

LIM (C. E.). **League of Nations Grading of Far Eastern Ports.**—*China Med. Jl.* 1925. May. Vol 39. No. 5. pp. 422-431.

The writer refers to the recent establishment of an Epidemiological Intelligence Bureau for the Far East and especially to the grading of ports.

So far as China is concerned it will at once be recognised that in most of the ports of the country there is scarcely any health organization capable of coping with the minimum requirements of the League as regards the prevention of the dissemination of disease.

Most of the health officers appointed to treaty ports have been busy local practitioners who cannot reasonably be expected to give their full attention to port sanitation. As a result, the Quarantine Service has, as a whole, been very backward and the available information as to its activities is extremely scanty.

Neither of the two largest ports, Hong Kong and Shanghai, can be graded as "first class" under the grading of the League. Hong Kong being a British Colony and under one administration can, without much difficulty, introduce the necessary improvements to make it a first class port. In the case of Shanghai, however, the proposition is different.

The city of Shanghai is made up of three distinct and independent administrative units: the International Settlement, the French Settlement, and the Chinese City. Each of these has an equally significant part as far as the health of the port is concerned.

The International Settlement has an efficient Public Health Department run on British lines and the French Settlement has a Sanitary Service in accordance with French practices, but in the Chinese City there is hardly any attempt at an organized health administration. The port health authority is vested in the Commissioner of Customs, who is assisted by a Port Health Officer stationed at Woosung. The latter in turn is dependent upon the health organizations of the city for his information as to the prevalence of infectious disease. Owing to the imperfect notification of infectious diseases the actual state of the city can only be guessed.

The writer proposes, therefore, in view of the fact that Shanghai, which is the fourth largest port in the world, should be capable of classification as a first class port, that a sanitary survey should be undertaken. The object of the survey will be to collect information, to advise the people as to their own sanitary condition, and to utilize the collected data as a basis for action towards such measures as will make Shanghai a port of the first class under the provisions suggested by the Health Committee of the League of Nations.

After reading the paper, the Conference Section on Public Health unanimously adopted a resolution embodying the above proposals.

CLEMON (F. G.). **The Moslem Pilgrimages and the International Control of Disease.**--*Jl. State Med.* 1925. June. Vol. 33. No. 6. pp. 251-269. [5 refs.]

There are two great Muhammadan pilgrimages—the Haj, or annual pilgrimage to Mekka and Medina, and the Shiah pilgrimage to certain "holy cities" in Iraq and the adjoining countries. The Haj has long been recognised as offering a real and serious danger for the propagation of epidemic diseases.

Interesting details are given as to the customs peculiar to these great Muhammedan pilgrimages, and particulars are supplied of the extensive organizations provided for sanitary control. In many particulars these organizations have been disorganized or changed owing to the new conditions following on the War of 1914-18, and the point of the communication is to call attention to the great need for co-ordination by the different authorities in the several countries from which the pilgrims flock. That need has now received international recognition, and it has been proposed to the Health Committee of the League of Nations that it should be met by the formation of some

Co-ordinating Commission on which the principal countries and sanitary authorities concerned are represented. Its object should be to envisage each of the great pilgrimages (whether the Mussulman pilgrimage to the Hejaz and Iraq or the Christian pilgrimage to Jerusalem and elsewhere) as representing one great problem, or rather one group of problems, the solution of which is to be found in an orderly co-ordinated system of prophylactic measures in place of the piecemeal measures hitherto applied by individual countries mainly concerned with their own particular aspects of the question.

SCHAEFFER (H. F.). **De la ventilation à bord des navires de commerce pour l'aération et la lutte contre la chaleur et l'humidité.**—*Rev. d'Hygiène*. 1925. May. Vol. 47. No. 5. pp. 435-453. With 1 text fig.

The conclusions of the writer on the ventilation of ships are summarized as follows:—

1. *In the stoke-hold and in the engine room.*

In the former better use should be made of the draught of the funnel-casing by bringing down the screen in the stoke-hold to a lower level, to just above the height of an average man.

In the engine room it is advantageous:—

(a) To instal the sky-lights in such a manner that they may open vertically. If necessary the hatch may be surmounted by a windmill in order to facilitate as much as possible the removal of heated air.

(b) To avoid any openings in the partitions of the well-room.

(c) Definitely to avoid the introduction to the well-room of wind-sails unless these are of at least 1 metre in diameter or unless their walls can be lined conveniently with insulating material.

(d) To replace a number of windsails by one of large dimensions situated external to the engine room which divides at its termination into branches introducing the fresh air at floor level.

2. *Occupied part of the ship.*

(a) To utilize natural ventilation by making use of currents from the engine room and the stoke-hold.

(b) The employment of compressed air for ventilation.

(c) To make use of the hot compressed air employed for firing.

(d) To ensure the cleanliness of berths by washing with abundance of water and their subsequent dryness by compressed air.

(e) Carefully to avoid dampness and to secure aeration.

VAN HASSELT (Th. L.). **The Sanitation of Baco-Baco, Capital of the Sub-Division Boeton (S.E. Celebes).**—*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië*. 1925. Pt. 1. pp. 72-85. With 5 text figs. and 6 figs. on 5 plates.

This is an account of anti-mosquito work carried out under the direction of the civil and military administrator of the sub-division of Boeton, who obtained his knowledge of the manner in which the sanitary measures should be conducted from the study of a booklet entitled "The Sanitation of Sibolga", published by the Public Works Department. It is an excellent example of what can be achieved by non-technical individuals who are prepared to put their own hands to the work with the means at their disposal.

A swamp of some 30 acres in extent situated in the immediate vicinity of Baeo-Baeo, which was subject in places to tidal flooding, was believed to be the probable breeding-place of Anophelines. Until 1922, it is stated, Boeton, and more especially the capital Baeo-Baeo, was a hotbed of malaria. No European stationed there escaped infection, and in the encampment the brigades were only able to march by combining two brigades into one. The number of deaths in the civil infirmary and in the prison was very high, and in a strength of 350 people on an average amounted to 20 monthly. In the adjacent district of Bataeloe the splenic index of children from 2-10 years amounted to 100.

The entire work was carried out in three months, at a cost of f.11,440, statute-labour being employed. The methods employed consisted of the following :—

1. Cutting all reed-grass and brushwood, and thoroughly weeding out all the roots.

2. Raising those sections for which this was necessary with regard to the water level. For this purpose some 50,000 cubic metres of soil were required, and an underground water level of -1 metre was aimed at.

3. The construction of a system of closed drains in order to drain the rain and surface water. The main drain, however, had to be left open, but it was provided with a cement floor in order to facilitate cleansing. In one situation an intercepting drain at the foot of hills was necessary.

4. The construction of three sluices to permit drainage to the river when low and to prevent flooding at high tide.

Details of the drainage are of interest. The cement floor for the main drain was provided as shown in fig. 51.

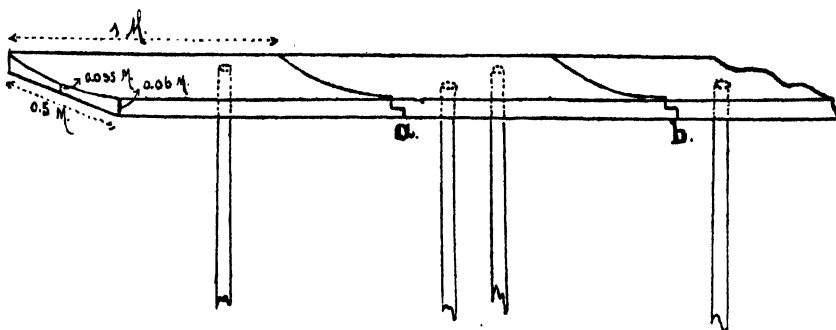


Fig. 51.—Sanitation of Baeo-Baeo Swamp. Construction of the floor of main drain. Cement slabs connected by rectangular joints as at *a* and *b* and supported by mangrove piles driven about 3 metres into ground.

The cement slabs were connected at *a* and *b* by a rectangular joint. The soil being exceedingly muddy, the slabs were laid on a bed of sand 0.5 metres in depth and supported by piles (two to each slab) made of mangrove wood and driven to a depth of about 3 metres. The sloping sides of the drain were strengthened with coral-rag and the bottom 0.5 metres on each side of the cement floor was plastered. In this plastering holes were provided at 2 metres apart to facilitate subsoil drainage. A section of the completed drain is shown in fig. 52.



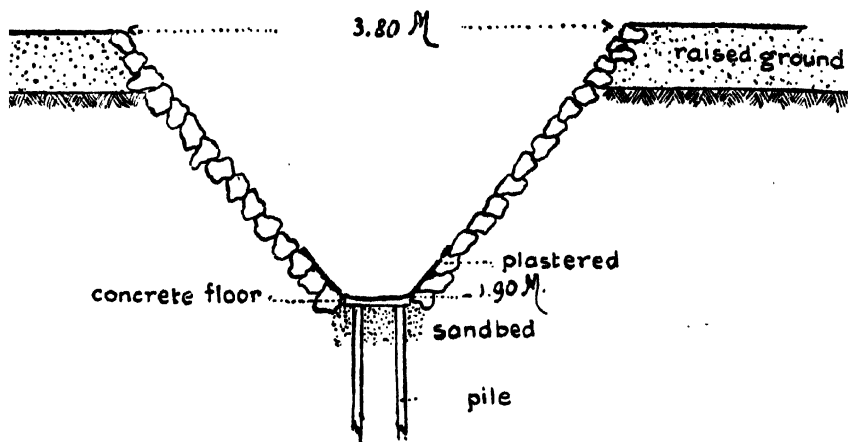


Fig. 52.—Showing section of main drain completed.

The methods by which the closed drains were made is shown from figs. 53, 54 and 55.

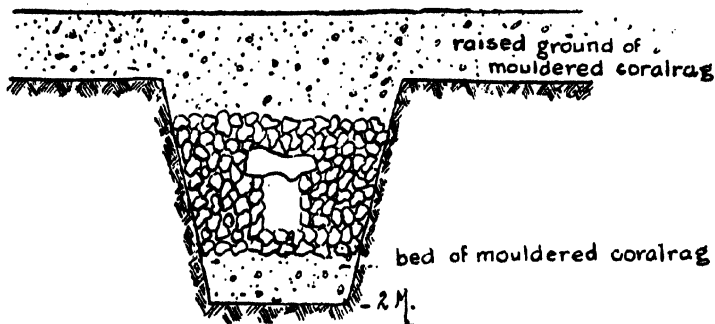


Fig. 53.—Showing method of construction of a closed drain.

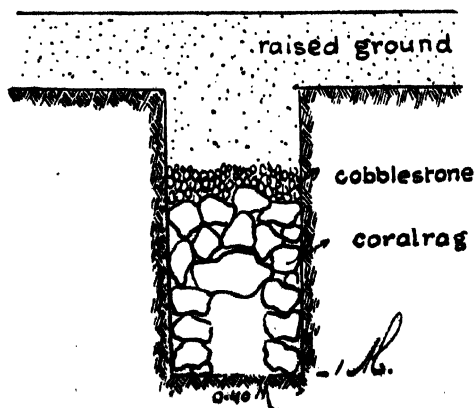


Fig. 54.—Showing method of construction of a closed drain in a section where formerly mud heaps due to crabs had caused a nuisance.

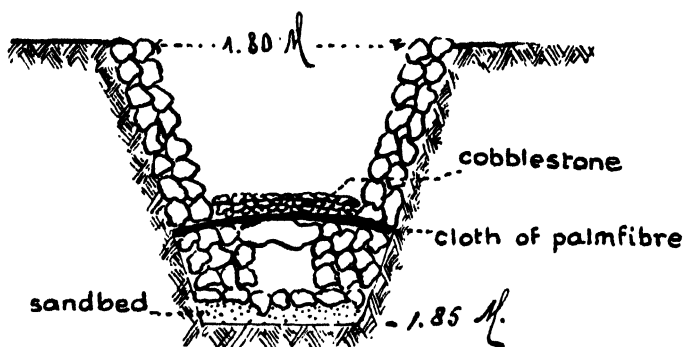


Fig. 55.—Showing method of conversion of a shallow ditch along road into a closed drain.

[Figs. 51 to 55 reproduced from *Mededeelingen van den Burgerlijken Geneseskundigen Dienst in Nederlandsch-Indië*.]

In certain positions trouble was experienced after the section had been raised to the necessary level from heaps of mud worked up by crabs; the provision of the closed type of drain, however, abolished the trouble owing to the satisfactory drying of the ground that resulted.

The good accruing from the work undertaken is shown by tables consisting of the number of temperatures taken in the infirmary of the women and children who were either patients in hospital or who attended for out-patient treatment. A summary is given:—In 1922, 778, and in 1923, 183 cases. The splenic index of children from 1–10 months situate within a radius of  $1\frac{1}{2}$  kilometres round Bae-Bae after the sanitation works was completed amounted to 13. Of older children from Bataoeloe of the age group 2–10 years, among whom a splenic index of 100 was recorded in 1922, the corresponding figure after completion of the works was 32.5. The mortality in the infirmary and in the prison had fallen from 20 deaths per month to about 3 a month. The reclaimed swamp was also in considerable demand for coconut and banana planting, and for land on lease for building purposes; in one section a vegetable plantation was established, and in other positions a race-course and a football ground had been provided.

REVISTA MEDICO-CIRURGICA DO BRASIL. 1925. June. Vol. 33.  
No. 6. pp. 273–286.—**A Saúde Publica no Brasil em 1924.**

A summary of public health conditions and projects in Brazil in 1924. Figures show that the death-rate is steadily diminishing—20.17 per mille in 1922, 18.35 in 1923, and 16.04 in 1924. Smallpox, owing to thorough vaccination and re-vaccination, is now officially declared to be extinct in Rio de Janeiro. Tuberculosis is still widespread, and the Government is taking in hand the construction of a hospital for tuberculous patients at Jacarépaguá. Educational propaganda and the appointment of health visitors are proceeding. Yellow fever is practically abolished from Rio de Janeiro, but cases still occur in places on the coast and in the Northern States. For dealing with leprosy, proposals are brought forward for the establishment of the colony system in the Northern States and of a leprosarium near the capital. Extensive plans for the amelioration of the water-supply are being carried out, and the report states that it is hoped the work will be

completed by next June. Due acknowledgement is made of the help afforded by the Rockefeller Foundation and the staff of the Instituto Oswaldo Cruz.

H. Harold Scott.

LEIPER (R. T.). **The Public Health Significance of Recent Advances in Helminthology.**—*Jl. State Med.* 1924. Nov. Vol. 32. No. 11. pp. 531-534.

The knowledge of helminth infection now acquired as a result of research should, if properly applied, ensure the control and eventual eradication of the infestations of man with parasitic worms.

The important facts from a public health point of view are :—

(a) That parasitic worms do not multiply within the human body.  
(b) That the eggs or embryo must first leave the human body which harbours the parents. The great majority leave in the faeces, others leave in the sputum or urine and some which circulate in the blood can only leave if sucked up by a biting insect. The guinea worm is peculiar in that she discharges her young through a breach in the skin in the hope that they will reach water.

(c) That the eggs or embryo are not infective to man at the moment of leaving the human body (except in those cases in which man can also become infected with the larval forms).

(d) Developmental changes occur during the period of delay outside the body, and are essential to the formation of the "infective" stage.

(e) The environmental conditions requisite for the developmental changes outside the body vary with the different species.

(f) The infective stage enters the body in most cases by the mouth in food or as contaminations of food, but in certain instances the infective stage actively pierces the skin.

(g) After entry, the infective stage has, in many species, to undertake an extensive pilgrimage within the body; in some cases through the blood stream, in others through the tissues or serous spaces, before it can successfully attain to sexual maturity in its normal habitat.

(h) Few of the parasitic worms are specific to man. It more frequently happens that the same species is also prevalent in one or other of the domestic animals. These additional "reservoir" hosts may play an important part in the spread of infection.

Control of helminthic infection may be secured by breaking the life-cycle at certain vulnerable points :—

(1) The adults may be killed by anthelmintics within the human body. (This applies to intestinal forms.)

(2) The eggs or embryos may be killed while in the human body by therapeutic agents. (This applies so far to *Bilharzia* eggs.)

(3) The eggs and embryos, when in the body discharges, may be "sidetracked" by "conservation" measures, or in many cases simply by lack of access to water necessary for the hatching of the eggs.

(4) Re-entry of the infective stage may be prevented by—

(a) Avoidance of exposure to infective soil (*e.g.*, the use of boots and clothing in the case of hookworm).

(b) Avoidance of bathing in canals and ponds liable to be contaminated (*e.g.*, *Bilharzia*).

(c) Avoidance of raw unfiltered water for drinking.

(d) The cooking of fish, meat, and shellfish, including fresh-water prawns and crabs, and of vegetables upon which eggs may have been deposited (*Ascaris*, *Trichocephalus*) or infective larvae become encysted (*Fasciolopsis buski*).

(5) Where an intermediate host is essential, a knowledge of its bionomics or susceptibilities may suggest means by which it can be eradicated, *e.g.* :—

(a) The use of chemicals, such as copper sulphate, which have a lethal action even in high dilutions against fresh-water molluscs; the introduction of ducks and the sudden exposure of the molluscs to drying as has been suggested in Egypt for the control of bilharziasis.

(b) The reduction of numbers by hand collection, as has been tried against *Melania* molluscs responsible for the spread of lung-fluke in Asia.

(c) The application of anti-mosquito measures for the control of filariasis.

In order to utilize the knowledge we now possess, the Medical Officer of Health should have a sound working acquaintance with the life history and all other necessary matters connected with the parasitic worms which are of moment in endeavours to prevent disease arising through their agency.

MUNRO (David). **The Influence of Aerial Transport on Epidemiology.**—*Public Health*. 1925. June. Vol. 38. No. 9. pp. 271-274.

This subject was dealt with in the Presidential Address to the Naval, Military and R.A.F. Hygiene Group, Society of Medical Officers of Health, London, 5th December, 1924. It is a matter that must have some time or other entered the minds of many.

That aerial travel is of import from the point of view of the prevention of disease is obvious, for the interval between embarkation and landing is so shortened that no longer is it possible to quarantine a "contact" or a "suspect" on landing, unless by wireless notification to the air-port of arrival the authorities there can get sufficient time for action.

The steps, therefore, required to deal with the diffusion of such diseases as cholera, typhus, smallpox and influenza have to be considered in a new light, and thus constitute one of the problems of aviation of international importance. The existing organization whereby weekly bulletins are issued, while still sufficing for any ordinary menace by sea, will not provide a sufficient safeguard where aerial travel is concerned.

Instance as to the possible rapid spread of infective disorders through aerial transport was supplied by the outbreak of cholera in Iraq in the previous year at a time when the annual pilgrimages to various holy places in other countries were in being. Communication between Iraq, Palestine, and Egypt has developed to such an extent that Baghdad is now less than 24 hours distant from Cairo, and the journey is performed regularly by air in less than the incubative period of the disease quite apart from the question of "contacts" or "carriers."

The address also dealt with the possibilities of the spread of diseases and their introduction *de novo* to countries so far exempt. One has only to imagine a Communication Service—for example, an Airship

Line between India and Africa (and this may not be so many years ahead)—taking hours instead of days, and the danger comes within measurable distance.

Mankind is, however, not the only consideration, for the re-infection of England with rabies after an immunity of many years has actually occurred, due, it is believed, to the importation of a rabid dog by aeroplane. The eradication of this outbreak alone must have cost this country a very considerable sum in money, let alone other matters connected with the measures necessary to stamp out the disease.

An interesting point is raised as to the possible spread of infection from aeroplanes either by accident or by malice aforethought. It is held that this is not a serious danger, for the influence of gravity in the fall reduces semi-solids to a finely particulate state. This has been proved by the experiment of dropping eggs out of aeroplanes from several thousand feet; they simply disappear into fine egg-rain before they reach the ground. It is probable also that bacteria would not survive the swiftness of their descent.

FISHER (H. C.). **The Panama Canal as a Barrier against the World-Wide Spread of Disease.**—*Milit. Surgeon*. 1925. July. Vol. 57. No. 1. pp. 18–22. With 1 map.

Apprehension has not infrequently been expressed that the Panama Canal might facilitate the spread of certain diseases. This article explains, however, that on the contrary the Canal is an active force for the detection, suppression and eradication of communicable disease owing to the unceasing vigilance of the Canal Authorities and to the efficient manner in which preventive methods are conducted. The two chief diseases of concern are yellow fever and plague.

In at least one seaport actual stegomyia control was inaugurated and effectively carried out, and the port, which was situated in a country where yellow fever existed, was thus rendered practically non-infectible. Cordial relations and mutual co-operation between the United States and the countries concerned enabled these measures to be undertaken.

While yellow fever existed, ships from infected countries were fumigated preferably at port of departure or upon arrival at the Isthmus. If necessary the ship was held in quarantine during the incubation period of the disease, the passengers carefully inspected in order to remove any sick from their midst, and a careful search made by trained mosquito catchers for any stegomyia mosquitos that may have remained on the ship.

As regards plague, the terminal cities of the Canal are models of ratproof construction, and regulations as regards building are strictly enforced. The greatest care is taken to prevent the breeding and harbouring of rats. A daily catch is made from localities bordering the water fronts as an index of prevalence; so far no infected rodents have been found. As the result of these measures rats have become relatively scarce, and it is believed that there is very little chance of bubonic plague existing or being propagated.

That these precautions have been successfully taken without causing interference or obstruction to shipping agents, masters and owners, is

shown by the fact that letters are actually received containing appreciation and commendation from shipping interests of the work done by the quarantine stations. It is realized that sanitation pays.

WALLACE (Edward Wilson). **Co-operation in a School Health Programme.**—*China Med. Jl.* 1925. May. Vol. 39. No. 5. pp. 437-444.

Every missionary can recall tragic cases of gifted boys and girls whose lives have been cut short, or whose usefulness has been impaired, by lack of proper attention to their bodies. Experiments in co-operation between doctors and teachers have shown what can be done to cure and to prevent disease.

The China Medical Missionary Association and the China Christian Educational Association jointly arranged for a "School Health Conference" to which the Council on Health Education, the Y.M.C.A., the Y.W.C.A., and the Nurses' Association of China were asked to appoint representatives. The Conference met on three days in December, 1924, and the point debated was "What is the need for the co-operation between doctors and teachers in securing the health of students, and what procedure will secure that co-operation?"

The Conference agreed that a "School Health Programme" must include six things:—

1. There must be a sifting or "screening" of students who enter the schools, in order that those who will be a menace to the well-being of the student body may be excluded.

2. Since disease may attack a student at any time, there is need for constant watchfulness, and it is held that a regular health examination at least once a year is an essential part of any attempt to keep students healthy.

3. When remediable defects and diseases have been detected, responsibility for seeing that the treatment is given and for checking results should rest with the school principal, while the actual treatment would be given by the school nurse or doctor, where there is one, or by the hospital staff either in their regular clinics or in special school clinics. Examples showed that a better organization of the existing personnel and time-tables was more necessary than a larger personnel and more time.

4. The Council on Health Education and the China Christian Educational Association were invited to consider the securing of better textbooks and teachers' manuals on health subjects, and to draw up synopses of practical courses of instruction. It was recognized that school and college provide ideal centres for the dissemination of knowledge concerning the health of both the individual and of the community.

5. It was agreed that what students require is not so much drill and calisthenics as the organized playing of games that has been given so large a place in school life in England.

6. Sanitation of the school plant and of the school routine is of the utmost importance.

The missionary of broad vision realizes that man possesses a body as well as a soul.

SOUTHERN MEDICAL JOURNAL. 1925. June. Vol. 18. No. 6. pp. 432-482. With 3 text figs. [17 refs.] **Symposium on Malaria.** [FERRELL; WALCH; HEGNER; DARLING; KING; MAXCY, SMILLIE & PLECKER; LE PRINCE; WELCH; FRICKS; RANKIN; BAIR; FORT; DOWLING; UNDERWOOD; ENLOE; HAYNE; CRITTENDEN; DUGGAN; WILLIAMS; LENERT; RAWLINGS.]

Note may be made of the following contributions:—

FERRELL (J. A.). The Malaria Problem in the South.

The distribution, incidence and severity of malaria throughout the country has steadily declined since the Civil War. In the New England States, New York City, New Jersey and Indiana the disease is no longer considered to be of any public health significance. Similarly it has receded over an extensive area, including the Middle Atlantic and Middle Western States, so that now only 16 States contain counties in which the disease may be regarded as of public health importance. The factor of the greatest importance has been drainage for the purpose of reclaiming land for agricultural purposes.

The forces operating against malaria in the South have been systematically stimulated during the past 10 years by public health agencies.

WALCH (E. W.) Some remarks on the Malaria of the Dutch East Indies.

Generally speaking, malaria still remains a greater problem than does hookworm disease. More than 20 species of Anophelines exist, of which only 3 or 4 are nowadays considered as carriers of importance. Continued experience and study of epidemics resulted in the possibility that the number of carriers in nature was greater than was first thought, and it was disclosed that certain species which were usually regarded as practically harmless could, under circumstances difficult to define, be responsible for epidemics. In this connexion *A. sinensis* and *A. kochi* might be mentioned.

As regards *sinensis*, until recently it was disregarded as a carrier, especially of subtertian fever, but an epidemic of this type of the disease among 800 coolies was found to be chiefly occasioned by this Anopheline. It was thought that the variation in infectivity might be accounted for by (a) either, a greater preference of the mosquito for lower animal blood, but experiments with buffaloes were inconclusive; (b) or, that there are two varieties of *sinensis* of different susceptibility, the *vanus* type of this mosquito having been associated with the epidemic observed.

On the matter of spleen indices it is recommended that the method of measurement described by CHRISTOPHERS be used, viz., (a) the distance of the apex of the spleen from the umbilicus; (b) the distance of the same point from the middle line of the body.

As regards prophylactic quinine, which was given in doses of  $\frac{1}{2}$  gramme of the hydrochloride on 2 or 3 days a week to Chinese coolies engaged in rice cultivation, failure due to inadequate supervision in the taking of the drug was first experienced. Rapid improvement in the condition of the children was, however, evident when the administration was carried out under daily control of an European supervisor. The beneficent results of prophylactic quinine properly administered was also evident in the case of coolies in the rice fields to whom it was given and villagers who took scarcely any.

The value of catching adult mosquitos as a means of control is emphasized. The whole population, including children, was armed with

catch-tubes made of bamboo, and a small reward was offered for captured anophelines. The effect was striking; before instituting the method a catch of 6,000 per month was obtained, but after the new scheme was in force the catch mounted to 33,000 in a population of 800 persons.

There is a general tendency in the Dutch East Indies to believe that a screen of cattle has considerable value in preventing infection of human beings, and the subject is being further investigated. Apparently it is chiefly a question of the relative numbers of men and animals, a sufficiently high proportion of the latter being apparently necessary before protection to human beings is afforded.

DARLING (S. T.). Medical Research in Malaria.

The following extracts from the communication may be noted :—The condition of the spleen in relation to malarial infection is shown in the subjoined table, the method of estimating the splenic enlargement being the usual, *i.e.*, (1) negative on deep inspiration, (2) palpable on deep inspiration, (3) palpable on normal inspiration, but not 1 finger breadth below the costal margin, and (4) one, two or three finger breadths below the costal margin on normal inspiration. The examination was carried out in coloured boys and girls prior to August 1st.

	Negative.	Palpable deep inspirat.	Palpable normal inspirat.	Fingers below costal margin.		
				one.	two.	three.
Number of cases examined	267	17	104	20	23	15
Number of cases positive blood	30	4	30	8	13	11
Per cent. of positive blood	11·23	23·53	28·84	40	56·52	73·33

The haemoglobin content provides interesting comparison with the spleen and parasite rates in a malarial survey. For the purpose of valid comparison it is necessary to divide the children into age groups, and if this be done a striking correspondence between the splenic enlargement and the degree of anaemia is evident, particularly in the age-groups of 2–5 years. The greater the enlargement of the spleen the lower the average of haemoglobin in the groups.

On the natural history of malaria, observation was made as to the natural course of events in a negro family who except for under-nourishment were otherwise of normal healthy stock. They lived in an unscreened house without quinine medication and were naturally infected with malaria. The mother was 32 years of age and the children 9, 6, 4, and 2 years respectively, two being boys and two girls. Comparatively few acute episodes occurred during the more than a year that they were under observation.

As regards symptoms, the mother had chills when her blood showed parasites. The girl aged nine had 4 chills during 6 months while her blood was positive, and tenderness over the spleen for 2 weeks. The boy aged 6 had no chills though his blood contained parasites for 5 months. The boy aged 4 years had only one chill during 12 months, when for a period of only two weeks his peripheral blood had been negative. The girl aged 2 had 10 chills in 12 months, her blood being negative only four weeks of this period. All the children looked normal and none looked chronically ill.



From the time of the first examination in November, 1923, until the beginning of an eight weeks' standard quinine treatment in March, 1924, all had shown parasites in the peripheral blood. The number of parasites ranged from 700 to 1 per 500 fields, and of gametocytes from 65 to 1 per 500 fields. The mother had all three species of parasite in her blood, as also had the girl aged 9. The boy aged 6 had only quartan, the boy aged 4 only subtertian parasites, the girl aged 2 had tertian and subtertian. Excepting for two weeks in March, two in April and three in May, one or more members of the family were at all times carriers of male and female gametocytes in sufficient numbers to be infective.

In general the haemoglobin curve inversely followed the parasitic curve. As regards spleen, the organ was palpable at all times in the children. In the girl aged 9 and the boy of 4 it ranged from palpable to the umbilicus; in the case of the youngest child from 2 finger breadths to the pelvis. In every case the size of the spleen varied from week to week, notable increase in size coming about a week after a notable increase in the number of parasites in the peripheral blood.

The association of blackwater fever with malaria is emphasized. An epidemiological feature which may have some significance is that a "house" or family susceptibility was noted. This suggests that haemolysis in blackwater fever may be due to an anti-haemolytic mechanism rendered defective in certain familial groups of persons by attacks of malaria and that this peculiar defective mechanism is heritable. Further, in view of the absence of the disease among pure-blooded negroes, many of whom suffer from malaria to the same extent as the whites who have blackwater fever, and in view of the well-known fact that races and individuals possess types of blood constitution, there is a possibility that only a certain group of persons is susceptible to the disease and that this susceptibility is heritable.

An important advance in the treatment of blackwater fever would appear to have been made by Dr. O. L. CRANFORD, of Sasser, and Dr. O. W. STATHAM, of Leesburg, Georgia. This consists of the use of anti-streptococcic serum after the discontinuance of quinine. The serum is administered subcutaneously and the rationale is that the horse serum which it contains furnishes an anti-haemolytic substance to the blood of the blackwater fever patient. The results in some 30 cases treated by this method have been considerably in advance of other treatment, and the mortality rate has been very low.

DARLING (S. T.). Entomological Research in Malaria.

A good many of the text books on malaria are compilations from the world's literature, and accordingly deal with other conditions than those to be met with in any particular locality. Borrow-pits are very generally stated to be breeding-places for anophelines, but this does not necessarily hold in a number of places in South Georgia. All borrow-pits are not a menace, and whether they will become so and breed *A. quadrimaculatus* depends upon their age and their proximity to habitations. In the newer pits plankton is scanty and sometimes limited to crustacea and diatoms; under these circumstances they do not support a rich anopheline fauna. When borrow-pits grow old and become filled with vegetation, then, in the neighbourhood of habitations, when other breeding-places customarily used by *quadrimaculatus* have dried out these possibly become implanted. Some discrimination

should therefore be exercised in the destruction of borrow-pits when there are other real problems affecting malaria in the neighbourhood.

Again, as a generalization the attitude of the resting mosquito is cited as a diagnostic point between anopheles and culex. *A. quadrimaculatus*, the malaria carrier of the Southern States, has a culex-like attitude when resting.

The relation of air and water temperatures to the density of larvae and adults has been traced. *A. crucians* appears in largest numbers in March, April, May and June, rapidly diminishing in July and thence more slowly. *A. punctipennis* appears throughout the year, adults increasing somewhat in numbers in the cooler months of spring and autumn. From the epidemiological point of view *A. quadrimaculatus* is the one species the density of which is positively correlated with the prevalence or intensity of malaria.

As regards feeding habits, the precipitin test gave the following results :—Of 236 *crucians*, 157 fed on cow, 33 on pig, 30 on horse, 11 on dog, 2 on chicken, and only 3 on man. Of 272 *quadrimaculatus*, 88 had fed on man, 130 on cow, 41 on pig, 7 on horse, 4 on dog and 2 on chicken. All the 10 *punctipennis* tested from which valid data were obtained had fed on animals and none on man.

Catches of adult female mosquitoes established the following :—*Quadrimaculatus* is to be found inside and under houses ; *crucians* is found under houses, under culverts and in outbuildings, but rarely or never inside habitations ; *punctipennis* is found in animal sheds, outbuildings, under bridges and under trees or other sheltered places out of doors. *Punctipennis*, while preferring animal blood, will attack man when he visits the resting places of the species in woods, particularly near streams. *Quadrimaculatus* is distinctly fond of human blood and is commonly found to enter houses at night through windows or doors or chimneys.

The dispersion of *quadrimaculatus* was studied. Most of the mosquitoes were found within  $\frac{3}{4}$  of a mile from the breeding-place ; very few had travelled as far as  $1\frac{1}{2}$  to  $1\frac{3}{4}$  miles—none were found beyond this distance.

Observations showed that *A. quadrimaculatus* may remain but a day or two within a habitation after obtaining a blood meal ; she then leaves the house for another resting place. That means that the mosquito usually completes a feed upon one person and does not remain in the house for more than a day or two. From this it follows that an infected anopheline will usually infect only one individual and will not infect a large number of persons as at one time has been suggested. Secondly, as the anophelines which have fed upon the inmates remove from the building in a day or two and their places are taken on successive nights by successive lots of mosquitoes, then, if it is desired to fumigate houses for the destruction of mosquitoes it will be necessary to do so every other day or two ; otherwise mosquitoes which have become infected will have left the house without being destroyed. House fumigation, therefore, is probably an impracticable measure.

Many of the contributions to the Symposium on Malaria relate to activities in the control of the disease in the various Southern States, and they do not contain matter of sufficient general interest for mention in the Bulletin.

CORNER (William). **Malaria in the Kirkuk Division of Northern Mesopotamia during 1923.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1925. Mar. 19 & May 21. Vol. 19. Nos. 1 & 2. pp. 41–69. With 8 charts and 2 maps. [5 refs.]

The following are the main features as to incidence of malaria amongst indigenous natives in the Kirkuk Division of Mesopotamia during 1923 :—

1. There are two malaria seasons :—

(a) The main one in the summer, from the beginning of June to the middle of August, caused by the malignant tertian and to a less extent by the benign tertian parasites ; and

(b) The lesser in the autumn occurs in late October and November, being most marked in the first half of the latter month. It is due to the malignant tertian parasite.

2. Malaria in 1923 showed certain features which were the outcome of epidemic malaria in the preceding summer. There was marked prevalence and predominance of residual quartan, which existed during the first 5 months of the year until the starting of the malarial season.

3. It is judged that quartan malaria is a comparatively common infection, and that its marked predominance was due to residual infection from an epidemic year in an area where quartan is particularly common. Quartan malaria was not confined to any one part of the division, but was equally prevalent everywhere.

4. Malignant tertian was the main cause of the summer and of autumn malaria seasons. Infections started somewhat later than the benign form (roughly 15 days) and rapidly disappeared with the passing of the malarial season. Crescent infections were comparatively not common. The main clinical manifestation was a quotidian fever of no great severity. Pernicious forms were absent.

Benign tertian was the earliest to appear in any number at the opening of the malarial season. This parasite seems to depart markedly from its usual rôle as a cause of relapses, its disappearance at the end of the malaria season closely resembling that of malignant tertian. There was no evidence that benign tertian was a factor in the autumn malaria season.

The season of quartan infectivity presumably coincided with the summer malarial season. This, however, could not be proved, fresh cases being obscured by the mass of already existing quartan fever. Triple infections were comparatively common, especially in the early months. Double infections were not common. Quartan malaria, as met with, has quite sustained its reputation as the cause of the extremely chronic infection.

5. Nomadic Arabs on the whole suffer very little from malaria. During both the summer and autumn malaria seasons they are in fixed camping grounds, and according to the malarial nature of these grounds so will malaria amongst them vary. Malaria was most seen among those who camped alongside the fringe of villages on the edge of the desert, to the west of Kirkuk and Taza Khurmatu.

6. The Quaraghan-Kifri-Tuz-Tauk-Taza-Kirkuk-Alton-Keupri road serves as a rough line of division of malarial endemicity. On the east

or hilly side malaria is hyper-endemic and shows very high spleen rates. The area to the west or desert side shows medium spleen rates, passing to low or nil the further one goes into the desert.

7. Malaria in the Kirkuk Division seems to be associated with :—

(a) A higher degree of splenic enlargement than that usually recorded.

(b) Very high spleen rates amongst the children and often a comparatively high rate in adults.

(c) A surprisingly low parasite rate in children and adults considering the high spleen rates.

The theory is advanced that (a) is due to the prevalence of quartan malaria. It is possible that this fact also contributes to (b) and (c).

8. Each malarial season was preceded by a marked increase of mosquito breeding, including anopheles.

9. A feature of the main malaria season was that it lasted throughout the hottest and driest month of the year, when the 8 a.m. mean temperature was about 90° F. and the mean relative humidity was below 30 per cent. Humidity, within limits, appeared to be of comparatively little importance in influencing malarial prevalence.

RODENWALDT (Ernst) & ESSED (W. F. R.). **Investigation into the Malaria at Tandjong Priok.**—*Meded. Dienst. d. Volksgezondheid in Nederl.-Indië*. 1925. Pt. 2. pp. 89–121. With 19 charts & 1 folding plan.

The following are the measures undertaken and the conclusions arrived at :—

At the end of 1922 the Batavian Public Health Service had sent information to the effect that the mortality figures for Kampong Kodja were rapidly falling, and it was proposed that the further direction of public health works should be taken over by the Chief of the Public Health Service. The following suggestions were made :—

1. All the drains in the whole harbour area of Tandjong Priok will need to be kept under observation for mosquito larvae and, if necessary, oiling will have to be instituted without delay.

2. In Kampong Kodja proper oiling of all drains should be continued once every five days. Two coolie gangs, one for oiling and the other for larva-hunting, will be required, they should work under the supervision of a sanitary inspector.

3. The fishponds east of the fishing harbour will have to be opened to the free entrance of the tide, and to be regularly cleaned.

These measures have had favourable results, and the condition of the coolie population as regards health has shown improvement during the latter half of 1922 and the whole of 1923.

The following are the final conclusions reached :—

(1) Malaria in Tandjong Priok is transmitted by *A. ludlowi* Theobald. It is probable that *A. rossi* also plays a certain part as a carrier.

(2) The most dangerous breeding places in Tandjong Priok are those that are situated in the harbour area proper, e.g., drains with stagnant water, holes and pools which are formed by the ground water or made during the construction of new canals.

(3) The rice fields south of the harbour area are not dangerous in their present condition. It, however, must be remembered that they may become a source of danger if fishponds are constructed therein. This should be prevented.

(4) The mangrove bush at the west now and again produces great numbers of *A. ludlowi*. Though the danger for the western part of the harbour is probably not very great owing to it being sparsely inhabited, yet it seems advisable that later on this land should be raised for a distance of 1 kilometre from the harbour area.

(5) In addition to other places the fishponds to the east must be regarded as dangerous as they are only some 450 metres from inhabited areas. If possible they should be filled in to a distance of at least 1 kilometre from the fishing harbour. If this cannot be undertaken on grounds of economy, the working of the ponds should be discontinued, free entrance to the tide provided and vegetation kept down.

(6) It has been shown that *A. ludlowi* readily breeds in collections of foul water. It can breed in fresh water or in salt even when the latter contains as much as 30 parts of salt per thousand. In fishponds it appears to thrive best in water containing from 12 to 18 parts per thousand. The essential condition is that decomposing matter must be present in the water, and it is not hampered by water strongly contaminated by faeces or urine.

(7) Oiling of the breeding places is an effective measure against *A. ludlowi*. Owing to the rapid disappearance of imagines where oiling was in force it is suggested that the life of the mosquito is short.

(8) Benign tertian infections gave rise to a carrier state more frequently than malignant infections. Six months after the measures mentioned had been applied the parasite rate in all groups of the population showed a very considerable decrease.

(9) No diminution in spleen rate was noticed in adults within six months of the application of the measures. With children, although no diminution of spleen rate was observed, a considerable decrease in the size of the spleens was noted.

(10) It is considered that the rise in the percentage of haemoglobin observed was due to the measures taken.

GAGE (E. H.). **Studies of Impounded Waters in Relation to Malaria.**—*Public Health Rep.* 1925. June 26. Vol. 40. No. 26. pp. 1357-1375. With 3 text figs. & 2 figs. on 1 plate.

It has been found that many factors must be considered in determining the potential danger of an impounded water from the malarial standpoint. Size alone is certainly not the most important factor, for the largest impounded water projects are frequently the least dangerous. Large reservoirs are often located in mountainous regions, with sparse settlements on their borders. It frequently happens, however, that small ponds impounded on the outskirts of villages as a recreation pond, water supply, or stock pond, may prove to be a greater malarial menace than the much larger body of water many miles away in the mountains.

Examples are given of various impounded waters which proved productive of malaria, their conditions are described and the species of anophelines discovered are detailed.

Certain procedures tending to reduce the production of mosquitoes in impounded waters have been outlined by the United States Public Health Service, which may be summarized as follows :—

(1) Clean banks.

(a) Fluctuation of water level.

(b) Removal of flottage.

(2) No aquatic vegetation reaching the surface of the water.

(3) A minimum area of shallow overflow at summer water level.

(4) Care of imported labour.

(5) Impounding of the water during the winter months.

(6) Introduction of *Gambusia affinis*.

(7) Occasional observation of the pond and its immediate vicinity.

These procedures are necessarily of a general nature, and the particular methods best suited to any one project can be determined only by a field survey.

Low (N.). **Anti-Malarial Work in Ismailia.**—*Jl. Roy. Army Med. Corps.* 1925. July. Vol. 45. No. 1. pp. 52–54. With 1 text fig. [2 refs.]

The object of this communication is to raise the point as to whether *A. pharoensis* is to be regarded as even a potential carrier of malaria. In 1923 both *A. multicolor* and *A. pharoensis* were taken and some 60 primary cases of malaria were evident among the members of the garrison. In 1924 no *A. multicolor* could be found, but *A. pharoensis* was abundant and invaded the camp from a marsh distant nine kilometres when the prevailing wind was from that direction; no primary malaria, however, occurred. Ample opportunities of infection were present, the troops at the time in the station having been heavily infected elsewhere before arrival at Ismailia, and having many chronic carriers amongst them.

In the "Official History of the War, Hygiene," Vol. ii, p. 209, *A. pharoensis* is stated to be the common carrier in Egypt. If that be so, it might have been expected that cases of malaria would be evident under the circumstances. If this mosquito is only such an occasional carrier as to be found practically of no malarial import, it is possible that a great deal of anti-malarial work may be saved.

BARNES (M. E.). **A Survey of the Turpentine Industry for Possible Larvicidal Substances.**—*Amer. Jl. Hyg.* 1925. May. Vol. 5. No. 3. pp. 309–314. [4 refs.]

The following raw materials, products and by-products of the turpentine industry, were studied upon the larvae of *Anopheles quadrimaculatus* Say, and various undetermined culicine larvae—crude gum as collected from turpentine trees, low wine (the aqueous distillate which comes from the condensing coils with the turpentine), sawdust from turpentine pine, turpentine oil distilled from gum, dross, rosin and pine oil.

Larvicidal properties in sufficient strength to merit further investigation were found only in turpentine and in pine oil. Turpentine is, however, too expensive to be employed in anti-mosquito work. Pine oil was found effective against both anophelines and culicine larvae and was further studied.

BARNES (M. E.). **The Toxic Action of Oil Films upon Mosquito Larvae with Particular Reference to Pine Oil Films.**—*Amer. Jl. Hyg.* 1925. May. Vol. 5. No. 3. pp. 315-329. [18 refs.]

It was found that pine oil had a powerful soporific or paralyzing effect upon larvae and pupae, and in effective doses results in their death either directly, or, apparently by drowning while under the effects of the oil. Both anopheline and culicine larvae are able to withstand prolonged submersion in water, and in some cases even after they have been subjected to an oil film and submerged in water it is possible to resuscitate them.

Pine oil, while a valuable agent, is not satisfactory from the point of view of film production, and it is suggested that another oil may well be utilized as a vehicle for carrying the toxic effects of the pine oil. A mixture of crude oil and pine oil in the proportion of one of the latter to nine of the former produces a better film than either of the ingredients alone, and forms a compound which is highly effective in destroying all stages of anopheline and culicine larvae and pupae.

ANNALES DE MÉDECINE ET DE PHARMACIE COLONIALES. 1925. May-June-July-Aug. Vol. 23. No. 2. pp. 343-346. **Instruction pratique pour la lutte contre le paludisme.** [Instruction adoptée par la Société de Pathologie exotique dans sa séance du 11 mars 1925.]

In response to a request from the Minister for the Colonies the Société de Pathologie Exotique has drawn up directions for combating malaria. All the well-known measures are set down and discussed, with a reminder that unforeseen expenses may be looked for. The employment of a trained entomologist for the study of the anopheles of local importance is insisted upon.

Six grains of quinine a day in two doses, or 15 grains twice a week, is recommended for all the infected. Free prophylactic quinine is reserved for persons under discipline (troops, prisoners, etc.), to whom 3 grains a day is given when the risk of infection is slight, but six grains a day is recommended for those exposed to intense infection.

Screening, when carried out with good materials and under supervision, is good, but as frequently done increases danger, and is best confined to those who themselves wish to employ it. The pursuit of adult insects in houses is useless unless thorough. As to treatment of acute attacks, the advice is that the dose of quinine for an adult should never exceed 30 grains in 24 hours.

Stress is laid upon the necessity for improved agriculture, housing and improvement of the general economic conditions of the population as offering the only permanent means of rendering healthy a malarious country.

HASLAM (J. F. C.). **Observations on the Experimental Use of Fish Indigenous to British Guiana for the Control of Mosquitoes breeding in Vats, Tanks, Barrels and other Water Containers.**—*Jl. Trop. Med. & Hyg.* 1925. Aug. 1. Vol. 28. No. 15. pp. 284-288.

Observations on the above were carried out on a large scale during August 1924, accompanied by closely watched experiments in the laboratory, and at the quarantine station and elsewhere.

The water containers to be dealt with are of innumerable variety, and include large specially built vats and tanks (comparatively scarce), 40 gallon casks (most common), old boiler casings, petrol cans, pans from derelict sugar mills, Dutch stoneware jars, and a host of makeshift and unscreenable containers.

The mosquitoes to be controlled and which select such receptacles as above for breeding are: *Aedes argenteus* (*Stegomyia fasciata*) and *Culex quinquefasciatus*, and occasionally *Anopheles tarsimaculatus* has been taken in an open water vessel.

The following local fish were give a trial :—

Local Name.				Provisional identification.
Hassa	...	...	...	<i>Hoplosternum littorale</i> .
Patwa	...	...	...	<i>Cichlasoma bimaculatum</i> .
Congo Patwa	...	...	...	<i>Polycentris schomburghi</i> .
Kakabelly	...	...	...	<i>Pecilia vivipara</i> .
Hoorie	...	...	...	<i>Hoplias malabaricus</i> .
Sunfish	...	...	...	<i>Crenicichla saxatilis</i> .
			...	<i>Tetragonopterus chalcus</i> ,
			...	<i>Charax gibbosus</i> ,
Silverbait,	also	called...	...	<i>Hemigrammus unilineatus</i> ,
Cellebe.			...	<i>Hemigrammus rodwayi</i> ,
			...	and one not identified.
Millions (a very small fish,	...	...	...	<i>Acanthocephalus melangonus</i> .
locally so-called)	...	...	...	<i>Acanthocephalus reticulatus</i> .

Of the fish experimented with the silverbait group, the hassa and the patwa appear to be the most serviceable.

For the smaller domestic water-containers it would be difficult to find a fish more generally suitable than the silverbait, whose good points may be summarized as follows :—

- (a) Enormous appetite for all early mosquito forms.
- (b) Preference for the forms most nearly hatched out.
- (c) Ease of obtaining these fish in unlimited quantity.
- (d) Ability of fish to live when only a minimum of water remains in barrels, etc.
- (e) Ability of fish to find a living after the original supply of larvae has been devoured.

Considerable care is needed in their capture and transport.

Hassa and Patwa are less suited to the small containers, but do well in large vats and tanks. Among their advantages may be enumerated :—

Hassa.	Patwa.
(a) Good appetite for larvae.	(a) Enormous appetite for larvae.
(b) Fairly easily obtained.	(b) Fairly easily obtained.
(c) Stands rough handling very well.	(c) Survives well in large containers.

Their disadvantages are as follows :—

Hassa.	Patwa.
(a) May be stolen for food.	(a) May be stolen for food.
(b) May jump out of vessel.	(b) Does not stand rough handling well.
(c) Does not seem to survive well unless large supply of larvae is continued.	



Hassa and Patwa can be used to advantage in such large vats and tanks as those of Government institutions, when the fish can be caught, handled and regularly observed by a trained staff. Throughout the villages, silverbait is proving the most satisfactory.

CAMERON (John). **Eradication of the Cockroach (*Periplaneta sp.*)**.—*China Med. Jl.* 1925. May. Vol. 39. No. 5. pp. 458-461. [3 refs.]

In the *China Medical Journal*, xxxvii: 689, 1923, the author discussed the method then in use in the Pekin Union Medical College to rid the place of cockroaches. The powder then used was fairly effective, very cheap and easily prepared. The composition was as follows:—

Corn starch	...	...	...	...	8 ounces.
Cane sugar in fine powder	...	...	...	15	"
Quicklime, powdered	...	...	...	3	"
Borax, powdered	...	...	...	5	"

The whole should be well dried and thoroughly mixed and preserved in tins with tightly fitting tops.

Continued experiments were carried out during the past four years to find a more efficient compound, and in 1923 a patent preparation was purchased in America which was guaranteed to kill cockroaches. This compound was found to be most effective, but it was much too expensive for general use. Analysis of a sample showed that the principal ingredient was sodium fluoride.

Finely powdered commercial sodium fluoride was accordingly mixed with powdered borax in the proportion of four of the former to one of the latter, and this has been found to be the most efficient and economical of all the powders experimented with.

The powder should be sprinkled around the floor of the infested apartment, especially at the junction of the floor and walls, and it should be allowed to remain for at least 14 days undisturbed. Then it is advisable to sweep the floor clean and to sprinkle more of the compound. In this way any room can be cleared of cockroaches. Too much of the powder should not be used at a time, a little laid along the junction of the walls and floor is quite as efficient as the use of large quantities. Usually after the first day many dead cockroaches will be found, but it is essential to leave the powder undisturbed for at least 14 days so that the older cockroaches may carry small amounts into cracks and crevices where their young are. In this way both young and old are destroyed; this process usually takes about a month.

BUCHANAN (George S.). **Les rongeurs et leurs parasites cutanés qui interviennent dans la propagation de la peste.**—*Bull. Office Internat. d'Hyg. Publique.* 1925. May. Vol. 17. No. 5. pp. 482-493. [1 ref.]

This is the second memorandum presented to the Committee of the Office International d'Hygiène Publique at the session held in April and May, 1925, by Sir George Buchanan, Senior Medical Officer of the Ministry of Health, as delegate of Great Britain.

Information was obtained from the following places: Palestine, Zanzibar, Nigeria, Iraq, Kenya, Hong Kong, Mauritius, Uganda, Straits Settlements, Gold Coast, Tanganyika Territory, and Ceylon.

A general summary is as follows :—

The black rat (*Rattus rattus*) is by far the most common at the present time in the African colonies (both eastern and western), in Palestine, and in Ceylon.

The brown rat (*R. norvegicus*) is unknown in Uganda and Tanga. In Ceylon it is only present in the poor parts of Colombo and in the vicinity of the port ; it is also found only in the ports of Palestine. On the contrary the brown rat represents 90 per cent. of rats caught in Mauritius, 70 per cent. in Iraq, and in the Straits Settlements and Hong Kong it is much the most prevalent.

In view of the circumstances that the capture of rats is frequently local in operation and depends upon special conditions (such, for instance, as the kind of bait employed), the relative proportion of the species caught in traps does not necessarily give at all times a true indication as to the general rodent population. Moreover, interesting changes take place with time ; for instance, that noted in Accra, where in 1908 *R. rattus* was not found, whereas in 1924 this species is more prevalent than *R. norvegicus*, which latter in 1908 was the most common.

The large pouched rat *Cricetomys gambianus* is found in Accra and also in Zanzibar. On only one occasion was this species found to be infected with plague at Accra ; occasionally, but rarely, other animals than rats have been found to be infected.

Five palm squirrels (*Funambulus palmarum*) were found dead of plague at Mawalapitiya in Ceylon, also one bandicoot, two mice and two cats. In Mauritius, 18 cats (17 of them in 1921) have also been found to be infected.

As to fleas, the reports show that *Xenopsylla cheopis* is probably the most dangerous rat-flea from the plague aspect. It is the most prevalent rat-flea in Palestine, Iraq, the Gold Coast and Zanzibar.

*X. astia*, which is considered as a species which harbours the plague bacillus, but generally without acting as a transporter of the organism to man, is the most common rat-flea in Ceylon. It is also found at Dar-es-Salam and Accra.

*X. braziliensis* appears to be the most prevalent rat-flea in Nigeria, Uganda and Kenya ; it is also present at Accra. It appears to be capable of transmitting disease to man, for at Kabete, 6 miles from Nairobi, it was the only species of flea found on black rats in a plague infected district.

TIWARI (C. D.) & LAL (R. B.). **A Note on the Efficacy of *Neem-batti* in the Destruction of Rats and Rat-Fleas in Rat Burrows.**—*Indian Med. Gaz.* 1925. July. Vol. 60. No. 7. pp. 310–311. With 7 text figs.

Fumigation of houses with cresol to kill fleas has shown that the fleas in rat holes are not killed, and that the rats are not affected. In order to kill the rats and fleas in the burrows, LANE (1924) devised the *neem-batti*. A standard *neem-batti* as issued by the Punjab Plague Equipment Depot, Jullundur, is prepared as follows :—

Pot. chlorat. dr. 2, Pot. nit. dr. 1½, and Sulphur dr. 2 are powdered together and mixed with dr. 5 of any oil to form a paste, to which dr. 1 of chilli-powder (red pepper) and a handful of crushed dried *neem* leaves (*Azadirachia indica*) are added. A wick of about nine inches made of thick cloth is soaked in a saturated solution of Pot. chlorat. The paste as above prepared is put over the wick leaving

about one inch exposed at the end. The wick is then encased in cloth and a piece of thick paper is wrapped round it. To use a *neem-batti* all openings, except one, of the burrow are closed, a *neem-batti* is then ignited and introduced into the open hole, which is then closed.

Experiments were carried out in natural rat holes in open fields, the holes were found to vary in dimension and design. They could be classified in the following groups :—

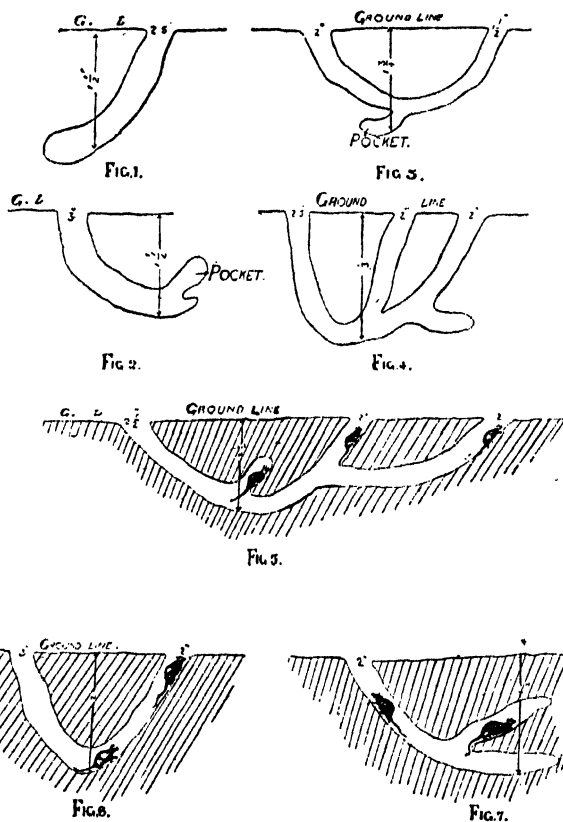


Fig. 56.—Showing various types of rat-burrows, and rats dead *in situ*.  
[Reproduced from the *Indian Medical Gazette*.]

- (1) A simple oblique blind hole (fig. 1).
- (2) A blind hole with a side pocket (fig. 2).
- (3) A burrow with 2 or 3 openings with or without pockets (fig. 3).
- (4) A complicated burrow formed by the intercommunication of 2 or 3 burrows (fig. 4).

The diameter of the openings was between  $1\frac{1}{2}$  to 3 inches and the maximum depth below the ground was 3 feet. The distance between two openings varied from 2 to 8 feet.

In a series of eight experiments in burrows of all types, in four of which the *batti* was allowed to smoulder for 5 minutes and in one each for 6, 8 and 10 minutes, the rats and the fleas on them were in all cases found to be dead. Figs. 5, 6 and 7 show the situations in which the dead rats were found.

It is concluded that fumigation with *neem-battis* in the manner described kills the rats and rat-fleas on them in burrows in fields in 5 minutes. It was noted that every nook and corner of the burrow was blackened with the smoke showing that all parts had been penetrated.

SEVERN (A. G. Millott). **An Outline of the History of Plague in Hong Kong.**—*Jl. State Med.* 1925. June. Vol. 33. No. 6. pp. 274-284. [21 refs.] also *Jl. Roy. San. Inst.* 1925. July. Vol. 46. No. 2. pp. 33-41. [21 refs.]

In 1894 plague appeared in Hong Kong having apparently arrived there from the province of Yun-nan about 900 miles distant, where it was known to have been endemic for many years.

The author details the state of knowledge regarding the disease at that time and carries the story on to the modern methods of prevention. Following on the active prosecution of present-day means of combating the disease, the incidence of plague has been gradually reduced until at the present time there has been no notification of rat or human plague in the colony of Hong Kong since September 1923.

#### WATER.

STEWART (A. D.) & GOVINDA RAJU (V.). **Economical Use of Alum in Mechanical Filters.**—*Indian Jl. Med. Res.* 1925. Apr. Vol. 12. No. 4. pp. 731-734.

In this class of filter it is usually stated that after cleansing an efficient filtration is arrived at after 15 minutes' run; it is, however, usual that the addition of alum is continued throughout the filtration process even when turbidity of the water does not call for any such addition. This involves a considerable expenditure on alum, and any economy that can be effected in its use would be an asset.

The investigators found that 15 minutes' run was not sufficient to establish a satisfactory amount of bacterial purification. Half-an-hour's run was found necessary for this purpose. Furthermore, it was determined in every case under observation that the maximum bacterial efficiency was attained within an hour of starting the process, and that thereafter no further improvement was effected even in cases where the bacterial efficiency is low and considerable room for improvement exists. A 90 per cent. efficiency was all that the filters showed within an hour of start after which there was no further improvement.

It was furthermore found that if the addition of alum was stopped after the maximum efficiency had been attained by one hour's work, the results were just as good as when alum was continued during the whole process of filtration. The water with which the experiments were conducted was clear as a result of storage, and the physical character, bacterial efficiency and reduction of organic matter were exactly similar in every respect as when alum was being used continuously.

It is accordingly concluded that rapid sand filters, when filtering waters which are not turbid, reach their maximum filtering efficiency

after having been fed with alumed water for an hour only, and the use of alum thereafter can be altogether dispensed with without in any way impairing their efficiency. A considerable reduction in the expenditure on alum might thus be effected.

GOVINDA RAJU (V.). **Observations on the Working of Slow Sand Filters.**—*Indian Jl. Med. Res.* 1925. July. Vol. 13. No. 1. pp. 33-39. [1 ref.]

An investigation extending over several years in the Madras Presidency by CUNNINGHAM and RAGHAVACHARI (1920) led to the conclusion that slow sand filters yield a purer filtrate than mechanical filters, and the general conclusions have always been in favour of the slow sand filter. The preliminary storage and settlement associated with this type of filter is a valuable asset, as the water reaching the filter has undergone some purification and has been freed to some extent from the susceptible pathogenic organisms. A temporary breakdown in the filtration process is therefore less likely to be attended with serious consequences than in the case of mechanical filters, where the period of storage is too short to be of great use. The continuous dosing with alum in the mechanical type is an expensive item and is really wasteful, as the waters of India during the greater part of the year are practically free from any appreciable amount of suspended matter, or if present at all, it is easily precipitated in the course of one day's storage without any coagulant. The cost of land does not militate against the adoption of the slow sand type, as land is generally available at a low cost.

Filters at the Hoogly-Chinsurah waterworks and at the Calcutta waterworks were selected for observation, the latter differing from the first-named in having no device for adjusting the rate of filtration accurately and the storage being less owing to silting up of the settling beds.

As regards the bacterial efficiency of slow sand filters at different times of the year, it was found that there was marked seasonal variation; in the case of the filters at both places the bacterial efficiency was lowest during the rainy season, and reached a fairly high standard during the rest of the year.

During the monsoon season the water carries a large amount of silt which is difficult to precipitate with the small amount of alum usually added and the short period of storage ordinarily permitted. This results in an accumulation of inorganic silt on the sand surface which proves fatal to the formation of a vital layer and is the cause of the low bacterial efficiency noted. Another disturbing factor is the scraping of the sand surface, after which the filter usually takes two and sometimes three days to recover its ordinary bacterial efficiency. When the sand bed is replenished with fresh sand it takes the filter more than a fortnight to attain even a moderate degree of efficiency.

In European countries it has been empirically found that a good filtered water should not contain *B. coli* in 50 cc. of water, nor a bacterial count higher than 100 per cc. A critical study of Calcutta shows that before the introduction of a piped water supply a considerable number of deaths from cholera and diarrhoeas was due to the polluted river water, and that the filtered supply has led to an immediate reduction in deaths from these causes. Bowel complaints are most prevalent during dry weather conditions, and analyses

of the standard of purity during this season showed the following :—

No lactose fermenters in 60 cc.	.....	80 per cent.
No lactose fermenters in 10 cc.	.....	98 per cent.

From the above it follows that filtrates from slow sand filters under Indian conditions should conform to a minimum standard of no lactose fermenters in 10 cc. of water.

Suggestions are given as to improvements in the present-day methods of working of the slow sand filters.

The running to waste of the water for a day or two after the periodical scraping of the top of the sand surface is considered as wasteful, and it is recommended that this water should be chlorinated and admitted into the clear water reservoir. It was found that the newly scraped filter was quite efficient in removing organic matter and that the filtrate was physically satisfactory immediately after scraping the sand surface.

After remaking the beds with fresh sand the present practice is to run to waste for a fortnight to three weeks. It is suggested that the sand bed be sterilized by passing through it for a few hours water containing a slight excess of chlorine, and that thereafter the filtrate be chlorinated as in the manner suggested for the filters newly scraped.

A careful study was made of the relation subsisting between high loss of head and bacterial efficiency of filtrate, and the conclusion formed was that so long as no violent fluctuation in the rate of filtration is allowed to occur, the filtration process proceeds quite smoothly in spite of the high loss of head and the latter should not therefore be regarded as an argument for closing the filter.

In order to prolong the life of the filters it is thought the practice of chlorination of unfiltered water to keep down algal growths should be given serious consideration.

Improved methods of gauging the rate at which the water is passing through the filter beds are necessary ; at present this is gauged by shutting off the inlet pipe and observing the linear drop in the level of the water on the filter bed. This method leads to very inaccurate results and beds have frequently been found to be working at only two vertical inches per hour when they were thought to be working at four. The simplest and most satisfactory arrangement that the writer has seen is the provision in the filter well of a floating syphon tube for drawing water, the arm of the syphon tube being also provided with a diaphragm for constricting it or widening it.

The substitution of continuous settlement for the present method is recommended, baffle-plates being arranged to direct the water from chamber to chamber.

As to the best method of adding chlorine it is held that the most advantageous is to combine the alum and the bleaching powder in one tank and to run in the combined solution into the raw water as it falls into the settling tank. It is held that the addition of chlorine to the clear water reservoirs involves lack of knowledge until the next day as to whether the dose has been effective or otherwise, unless an excessively high dose is given. By the means suggested it is possible to examine the water as soon as the settling tank is filled, and have a result the next morning before the water is led on to the filters. This method has been satisfactory in the case of the Hoogly water, which contains only a small amount of organic matter, especially after settlement.

WOLFF (L. K.). **Over een filter, dat ook bij tropische temperatuur steriel water levert.** [A Filter which passes Sterile Water even at the Temperature of the Tropics.]—*Nederl. Tijdschr. v. Geneesk.* 1925. Apr. 4. 69th Year. 1st Half. No. 14. pp. 1590-1598. With 1 text fig. [5 refs.]

The filtrating medium is the so-called "Norit," a vegetable carbon activated (*i.e.*, rendered highly absorbent) by heating in an atmosphere of hydrogen or carbonic acid. The filter already constructed by GRYNs with this substance has been improved by the author. After preliminary filtration to remove the loam and humus, which would clog the pores of the filter, the water passes a column of Norit of 15 by 15 cm., acidulated by hydrochloric acid. The filtration occurs at a temperature of 35° C. The water is passed at a rate of 1 litre per hour and is sterile for a fortnight, even if the original fluid was highly polluted (description of various bacteriological examinations). After this period the Norit must be renewed. The quantity of Norit which passes 14 by 24 litres of sterile water is sold at a cost of 1 florin Dutch (1s. 8d.), and is ready for use. The price of the filtering apparatus is not stated.

N. H. Swellengrebel.

CONNOLLY (Joel I.) & GORMAN (A. E.). **The Supplying of Drinking Water to Vessels in the United States.**—*Public Health Rep.* 1925. May 22. Vol. 40. No. 21. pp. 1042-1055. With 6 text figs. & 17 figs. on 7 plates.

By no means the least important public health factor concerned with vessel sanitation is the safety of the ship's water supply. At sea, water from overboard cannot be used for drinking purposes on coastwise vessels without distillation; in the Great Lakes the waters are generally of a high degree of purity, but subject to serious local pollution in the vicinity of cities. Two distinct divisions of the water problem may be recognized: (1) Where water is obtained from sources ashore; and (2) where it is obtained from overboard.

#### *Water supplies obtained from ashore.*

Given a satisfactory source (a safe water) the question resolves itself into one of getting the water aboard in a sanitary manner and of storing and distributing it so that its quality will not be impaired.

One source of danger is the occasional presence of a dual system of supply on docks and in shipyards permitting of a mistake being made in hydrants. On the Lakes the practice has been to identify hydrants by painting those supplying drinking water white, and those delivering water for other purposes red.

A second possible source of danger is the medium used for transporting the water from the hydrant to the vessel. Where delivery is made by hose the exercise of ordinary care should suffice. Where, however, the vessel cannot come alongside to enable connexion with a shore hydrant, some form of water boat becomes necessary. A well-designed water boat should be supplied with special drinking-water supply tanks entirely separate from the hull of the boat, and also have independent pumps for delivery purposes and no overboard

or bilge connexions of any kind. A practical difficulty has been that, because of the use of these vessels as auxiliary fireboats, owners insist on having overboard connexions to the pumps.

When the dock is fixed, hydrants are easily arranged; but complications arise when the dock must be moveable with the rise and fall of the water. In the former case they may be conveniently situated above the wharf floor and sufficiently close to the edge to permit a short hose to reach the vessel. The hose connection should point downwards to insure cleanliness. A short hose pipe is desirable to guard against the danger of having the end of the hose drop into a polluted harbour.

At river docks the wharf usually floats and is connected to the shore by a landing stage. The usual provision consists of a pipe line from the shore end of the landing stage to the river side of the wharf boat where the vessels dock. Each end has a hose coupling, the outer one for the short hose to the vessel and the other for a similar short hose to the nearest series of hydrants on shore. The shore

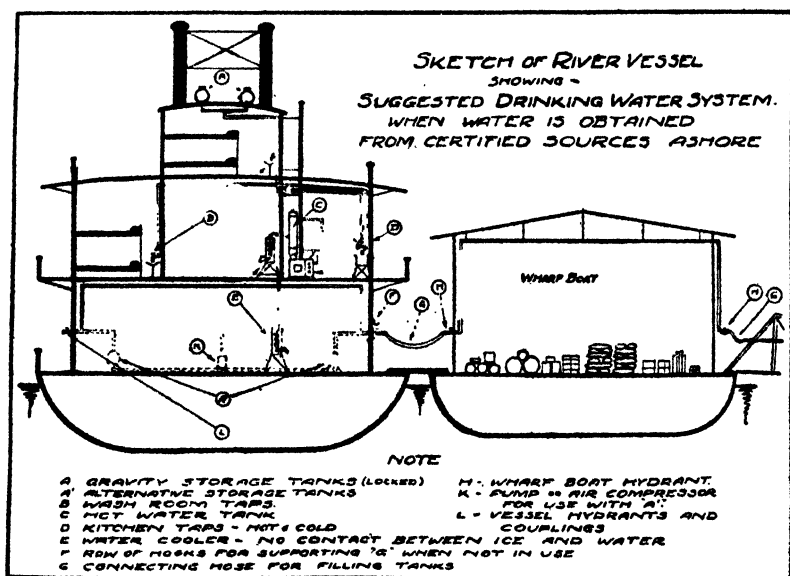


Fig. 57.—Section showing system for conveyance of drinking water from certified sources ashore to a river vessel alongside floating wharf boat.

hydrants are placed at different levels so as to allow of a short hose at any level of the water, and are in boxes below ground so that they do not interfere with either road transport or shipping when submerged.

A hose pipe should be reserved for filling drinking-water tanks and it should be properly identified. It should be provided with screw couplings at both ends, and when not in use should be stored on a reel in a clean container either on the dock or on the vessel, preferably the latter.

Before the above arrangements were made, drinking water was taken aboard in barrels, milk-cans, or any other receptacle that fancy or convenience might suggest.



As regards storage and distribution on board ship; the pipes should run to the sides at convenient places ending in down-turned hose couplings which are so located as to permit of a minimum length of hose to reach the dock hydrant. Coupling points should be well above the deck and capped when not in use. Many vessels have the pipes of the drinking water service painted blue to distinguish them and to guard against accidental cross connexions with other water pipes.

If gravity tanks are exposed they should be protected against freezing by insulation or steam pipes, and unless locked and identified by recognized signs they should not be in proximity to other tanks. They should be provided with vents ending in goose-necks (pipes with ends bent downwards) and overlapping lids.

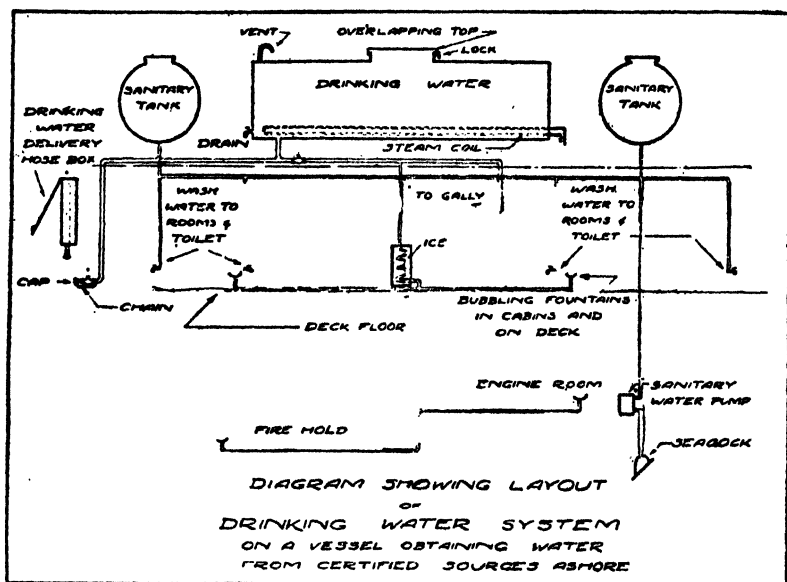


Fig. 58.—Section showing layout of drinking water system on a vessel obtaining water from certified sources ashore.

[Reproduced from *Public Health Reports*, Washington.]

Tanks in pressure systems are usually in the fore or after peaks or in the shaft alley between the engine room and the stern. Drinking water tanks should not be formed even in part by the hull, decks, or bulkheads of the vessel, lest the loosening of a plate permit the entry of polluted harbour or bilge water. The passage of drainage or soil pipes through the tanks was at one time fairly common, but it is now a thing of the past.

For cleansing, the tanks should be provided with proper drains situated above the level of the bilge water. If entrance to the tank is by a deck manhole, the collar should extend above the deck several inches to protect the opening. The cover of the manhole should be watertight, with a plate and gasket bolted to a flange. Tanks should not be located very close to boiler rooms; the forward compartments and the shaft alley are suitable places as they are usually cool. Peak tanks, forward or aft, are usually undesirable because it is a common practice to put the lavatories for the crew on the main deck above them.



Fig. 59.—The Old.—Drinking water was formerly stored in such containers as these, open or with removable covers, from which the water was dipped with the common drinking cup. The ice was in contact with the water.

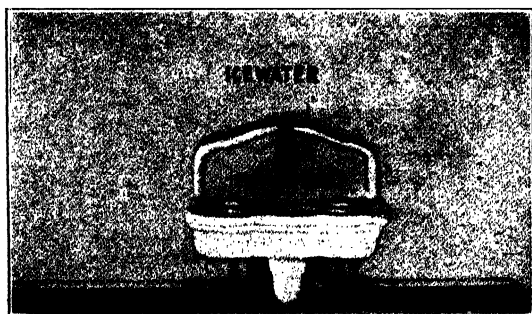


Fig. 60.—The New.—Present-day bubbler fountain supplying pure drinking water, cooled by passing through a coil of pipe in the ice box. The water does not come in contact with the ice. (Type of fountain now recommended is that having angle jet, protected orifice, and sanitary guards.—Ed., *Pub. Health Rep.*)

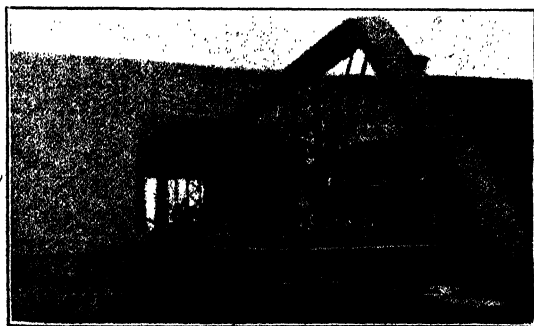


Fig. 61.—Landing stage at Paducan, Ky., wharf boat, showing pipe line with hose connected for supply of water.



Fig. 62.—Detail showing flexible permanent connection of pipe on wharf boat with pipe on landing stage, necessitated by the raising of the stage. Paducan, Ky.

[Reproduced from *Public Health Reports*, Washington.]

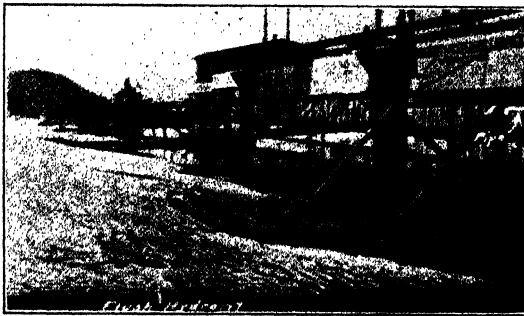


Fig. 63.—Levee [quay] at Memphis, Tenn., showing a flush hydrant, with cover removed, near the end of the landing stage, ready to be connected by hose to the pipe on the landing stage leading across wharf boat to steamer.

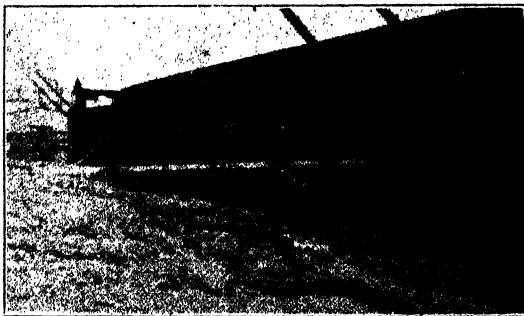


Fig. 64.—Levee at Cincinnati, Ohio, showing hose conducting water from the flush hydrant in the foreground to the pipe line along the bottom chord of the landing stage.

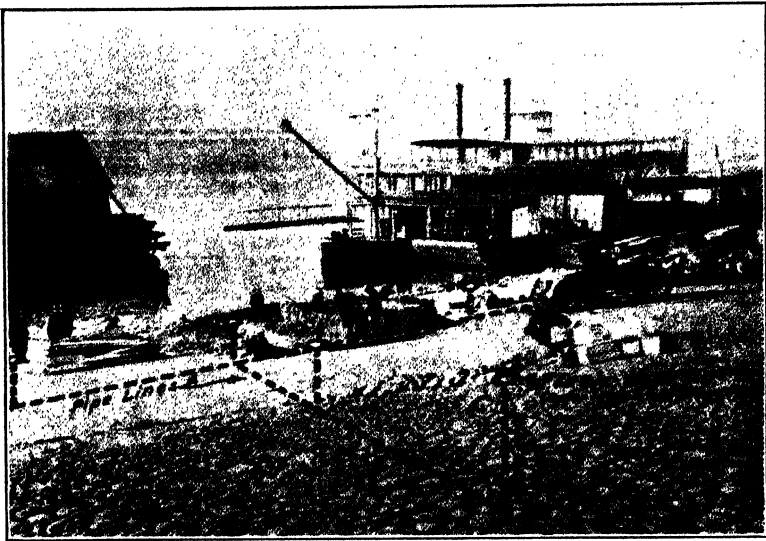


Fig. 65.—Pittsburgh levee during construction of pipe line for vessels. Dotted lines show the arrangement of pipes below the ground surface, with risers at intervals leading to hydrants flush with the surface. This use of flush hydrants avoids interference with trucking on the incline.

[Reproduced from *Public Health Reports*, Washington.]



Fig. 66.—Hydrant on dock, as used on the Great Lakes and the sea coast. Short hose extends to pipe on vessel alongside of dock. This view shows the desirability of having short hose in order to avoid having one end fall into polluted harbour water. Detroit, Mich.

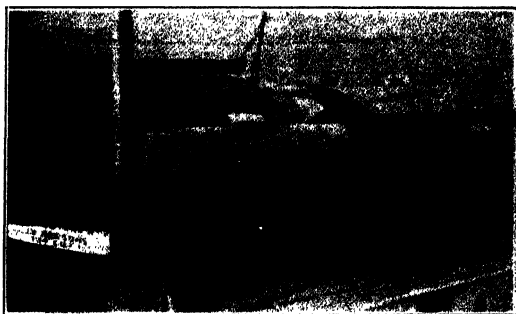


Fig. 67.—Storage tanks for gravity distribution system. Overlapping covers are locked. Where tanks are in close proximity to each other, as they are here, drinking-water tanks are identified by signs.

[Reproduced from *Public Health Reports*, Washington.]

Tanks are usually made of steel and will require protection from rust, especially where distilled water is stored; coatings of cement grout, bituminous material, enamel or glass may be used. After entry for cleansing purposes the tanks must be sterilized; 1 lb. of calcium hypochlorite to 5,000 gallons is commonly used for this purpose, followed by thorough flushing to get rid of the taste.

Water cooling must be so arranged that the ice does not come into contact with the water. Two methods are in common use: (1) A coil pipe in an ice-box, preferably close to the place where water is drawn; (2) a scuttle-butt in connection with the refrigerating machine and a special circulating system for ice water, having its own pump.

A number of serious epidemics have been traced to cross connexion between drinking and other water systems on vessels. The danger is an insidious one because of the extensive system of pipes on large vessels and an accidental cross connexion may easily arise. The most common location for these has been somewhere in the boiler or engine rooms. Cross connexions are expressly forbidden by regulation.

#### *Water supplied from Overboard.*

Water taken on vessels from overboard is delivered through sea cocks. Sea cocks being below water line always have a positive pressure on their valves and tight connections are needed to prevent seepage. Harbour waters are invariably grossly polluted, therefore the sea cock is always a dangerous connection to any drinking water system. Even in the outer waters of the Great Lakes the taking on of drinking water from overboard is fraught with danger. Vessels usually ply on well defined courses, and during the heavy shipping season there may be distinct lanes of pollution along these courses.

Sea cocks for drinking water should be separate from all other sea cocks and should be situated forward of all toilet outlets or at least on the opposite side of the ship from such outlets. They should not be connected to long lines of horizontal piping, for the fouling of such is difficult to correct. It is a good practice to have double valves on all sea cocks serving a drinking water system and to have an open

valve or "weep pipe" between them to give warning of any leak in the outer valve.

Storage tanks are usually in two groups: one for the raw water and the other for treated water. All units should be in duplicate.

### *Water Treatment Methods.*

Distillation is the common method of treatment on the Great Lakes freight vessels and inland river vessels. Because of the cost of production the supply is usually limited, necessitating a second source of supply for ablution purposes, which at best is an undesirable arrangement.

Other methods of treatment of "overboard water" for drinking are by ultra-violet rays, by ozone and by hypochlorites. Ultra-violet rays are used on 33 large passenger vessels of the Great Lakes fleet; where properly operated this method has given very satisfactory service. On two Great Lakes' passenger vessels and two Mississippi River excursion boats ozone treatment is employed. Where mica dielectrics are used instead of glass, and the contact of ozone and water is sufficiently prolonged and intimate, satisfactory results are obtained.

Last year the installation of the hypochlorite method was made on certain vessels. The stock solution of sodium hypochlorite is delivered at the desired rate in proportion to the pumpage, through an injector supplied by a revolving disc geared to a water meter. The disc, which dips into the hypochlorite solution, contains, in its periphery, a series of holes which, owing to surface tension, retain definite quantities of the solution, depending on the diameter of the hole. Serious objection as regards taste of the water have not so far been reported.

Ultra-violet rays, ozone and hypochlorites can economically produce a safe water in sufficient quantity for all domestic purposes on board ship; this is a distinct public health advantage, as dual water systems are potentially dangerous.

### FOOD.

HARTWELL (Gladys Annie). **A Comparison of Dried, Evaporated, and Fresh Cow's Milk.**—*Brit. Med. J.* 1925. June 13. pp. 1073-1075. With 2 charts in text. [6 refs.]

In these experiments rats were used, commencing when the animals were just weaned (three weeks old). The experiments were continued for 22 weeks, during which time several litters were born and reared; it was considered that a more searching test as to the adequacy of a diet is obtained by including gestation and lactation than if the actual period of growth is only investigated. White bread without crust (one day old) was provided with the different kinds of milk. Evaporated (condensed unsweetened) milk was diluted in accordance with the directions on the tin; in the case of dried milk 12 grammes of the solid were mixed with 100 cc. of water. The proportions given were 15 grammes of crumbled white bread to 36 cc. of liquid; the animals were given plenty of food, the ration being increased whenever necessary.

The conclusions are as follows :—

1. Dried milk as compared with fresh milk.

(a) The initial rate of growth of the young rats was more rapid, but the final weight attained was practically the same.

(b) The weight of the young on the second day was slightly better; that is, dried milk appears to be a better food for gestation.

(c) The suckling rats had thicker and silkier coats if the mothers were fed on the milk diet throughout their lives, but when the milk diet was only fed during lactation (that is a good mixed diet given during gestation), there was no apparent difference in the sucklings.

2. Evaporated milk as compared with fresh cow's milk.

(a) The rate of growth of the young rats was less rapid, and the final weight attained was less.

(b) The weight of the young at birth was less satisfactory.

(c) The weight of the young at weaning was lower. This applied equally to the baby rats of mothers fed on a good mixed diet during the gestation period, or on the milk diet throughout their lives.

Accordingly, the dried milk appeared to be quite equal in dietetic value to fresh cow's milk; if there was any advantage it was in favour of the dried variety. The evaporated milk compared less favourably with fresh cow's milk.

HENDERSON (J. B.) and HURWOOD (A.S.). **The Uniform Standard for Infants' Food.**—*Health*. Melbourne. 1925. May. Vol. 3. No. 3. pp. 75-81.

Since the establishment of standards for foods and drugs there has been no food which so much required standardization as to quality and labelling as infants' food. None of the standards so far adopted for the composition of infants' food by any of the Interstate Conferences on Food Standards have been at all satisfactory.

Undoubtedly by far the greater proportion of these foods is given to infants without any reference to a medical practitioner; provision is therefore necessary for such directions in the labelling as will ensure an average infant receiving a food supply which is sufficient both in chemical constituents and in daily quantity.

Samples of nine popular varieties of infant foods were examined, being made up in accordance with the directions for an infant aged one month, and it was found that not one of them would pass any of the standards adopted by the Interstate Food Conferences. Cow's milk also fails to pass the standards owing to its normal protein content being much higher than that of human milk. As several of the infant foods on the market are undoubtedly valuable preparations, it is obvious that these standards are unworkable, even though the last Conference in Sydney in 1922 allowed a 35 per cent. variation from the official composition of human milk.

The following suggested standard, while adhering as closely as possible to the standard last officially suggested, provides for several points which require attention.

**Infants' Food.**—Infants' food is any food described or sold as suitable for infants. It shall not contain any woody fibre or any mineral substances insoluble in decinormal hydrochloric acid, nor any preservative, and shall be free from rancidity.

**Labelling.**—No person shall sell or describe any food as suitable for infants unless there is written on the label legibly and prominently the following information :—

(a) The date when the food was packed.

(b) A statement showing the percentage composition of the food when prepared for an infant aged one month in accordance with the accompanying directions ; a statement of the source of the proteins and fats, and the nature of the carbohydrates present.

(c) A statement showing the average percentage composition of human milk.

For the purpose of this regulation the average percentage of human milk shall be deemed to be :—

Proteins...	...	...	...	...	1.5 per cent.
Fat	...	...	...	...	3.5 "
Lactose	...	...	...	...	6.5 "
Mineral matter	...	...	...	...	0.2 "

(d) A statement showing the number of calories yielded by the food recommended to be given per day at the age of one month ; and a statement of the average number of calories required by an infant aged one month, which for the purposes of this regulation shall be taken as 400 calories.

(e) The statements of percentage composition and of calories required in the foregoing paragraphs shall appear in the following form :—

					Human Milk.	Name of prepared food.
Proteins...	...	...	...	...	1.5	—
Fat	...	...	...	...	3.5	—
Lactose	...	...	...	...	6.5	—
Other carbohydrates	...	...	...	...	Nil.	—
Ash	...	...	...	...	0.2	—
Calories from 1 day's food	...	...	...	...	400	—

(f) Exact directions as to the method of preparing the food.

(g) A statement of the average amount of prepared food to be given to an infant at one time, and the number of times such amount is to be given per day ; such statements to be given for each month of age up to six months.

Provided that the above statements (b), (c), (d), (e), and (g) need not appear if the label contains the words " Unsuitable for infants under the age of six months," in bold-faced sans-serif capital letters, of not less than six points face measurement.

The erratic nature of the " teaspoon " directions raises the question of requiring every manufacturer to provide a measure with the packet of food. This has frequently been suggested, and such measures are already supplied by several manufacturers.

It was thought that the publication of the foregoing might create more interest in this important subject, and lead to useful criticism ere the final adoption of a definite standard.

WHITTAKER (H. A.), ARCHIBALD (R. W.) & SHERE (L.). **Relative Efficiency of Methods of Sterilization of Milk Bottles at Pasteurization Plants in Minnesota.**—*Public Health Rep.* 1924. May 2. Vol. 39. No. 18. pp. 923-929. [2 refs.]

The high bacterial content of bottles at plants where no provisions were made for their sterilization shows the need of proper sterilizing



facilities. In plants where the method of cleansing consisted of submerging the bottles in sodium carbonate solution, then placing on a revolving brush and a final rinsing in warm water, the average bacterial content was 542,300 organisms.

Results obtained on the sterilization of bottles with an apparatus using steam as compared with chlorine solutions indicates that chlorine is more dependable in routine practice at the plants investigated. This is specially evident at the smaller plants where manually operated apparatus is used.

Steam, when properly applied with automatic machines, gave satisfactory results, but in many cases the operators neglected to carry out certain details which are necessary to accomplish effective sterilization.

No objections have been reported as to odours or flavours being imparted to the milk, nor has any misuse of the chemical been observed where chlorine has been used for the sterilization of bottles for a considerable period. The preparation of the chlorine solution is simple, and the chemical is inexpensive. The method places at the disposal of the plant operator a sterilizing agent which is always available for immediate use.

DE (S. N.). **Infected Ice-Cream.**—*Indian Med. Rec.* 1925. June. Vol. 45. No. 6. p. 161. [3 refs.]

Using the methylene blue reduction test, which depends on Reductase reducing organic dyes to colourless compounds, the author found uniform results in milk examinations. These were as follows:—

1. Not decolorized for 6 hours or longer—milk good and contains less than 500,000 bacteria per cc.
2. Not decolorized in 2 hours but decolorized in less than 6 hours—average milk containing more than 500,000 and less than 4,000,000 bacteria per cc.
3. Not decolorized in 20 minutes, but decolorized in less than 2 hours—bad milk, and containing more than 4,000,000, but less than 20,000,000 bacteria per cc.
4. Decolorized in less than 20 minutes—very bad milk containing more than 20,000,000 bacteria per cc.

In the preparation of ice-creams the milk is boiled, but numerous opportunities occur for contamination during manufacture, especially in insanitary premises. The putrefactive processes thus set up may accordingly be recognized by the application of the above reduction test. Infection with specific organisms is commonly accompanied with infection by putrefactive bacteria, and these latter will provide evidence of their presence on the application of the test. Samples of ice-cream which respond positively to the methylene blue test should be rejected.

LA FAVRE (H. B.). **Epidemiological Report of an Outbreak of Food Poisoning which occurred in the First Battalion, Sixth Regiment, United States Marines, in Camp at the United States Naval Station, Guantanamo Bay, Cuba.**—*U.S. Nav. Med. Bull.* 1925. June. Vol. 22. No. 6. pp. 721-729.

While the camp was in quarantine on account of diphtheria an outbreak of food poisoning affecting 92 men occurred.

The clinical symptoms, though varying in intensity in different individuals, were similar in all cases. No ocular symptoms except slight dilatation of the pupil was noted.

From certain of the cases on bacteriological examination of blood, stools and urine, an organism was recovered which so far as the laboratory facilities of the camp permitted gave reactions of *B. paratyphosus B.*

An analysis of the foodstuffs consumed directed suspicion to fresh Cuban beef, but, unfortunately, none of the material was available for examination, as the remains had been disposed of. The hygiene of the cookhouse was apparently satisfactory, and neither rats, cockroaches, nor other vermin had access to the food. Flies were not prevalent, and the galley was comparatively free.

### CONSERVANCY.

TEMPLE (F. C.) & SARANGDHAR (V. N.). **Jamshedpur Sewage Disposal Works with Special Reference to the Activated Sludge Plant.**—pp. 61–88. [The Institution of Engineers (India).] With 1 folding chart, 2 folding plans & 4 figs.

This account is of interest, especially as it gives details of the working of the Activated Sludge process under tropical conditions. The installation at Jamshedpur will be found mentioned elsewhere in this *Sanitation Supplement* where it, along with two other installations of the same type in the tropics, are dealt with. This communication, however, deals with the installation in considerable detail, and there are certain points which may be noted.

Among the defects from a tropical point of view it was found that the air distribution system, as originally designed, gave a great deal of trouble. A radical defect for this climate was the use of rubber washers for all joints; the rubber soon perished and the joints leaked. The difficulty was overcome by replacing the rubber with lead.

It is difficult to define the characteristics of a good sludge in precise terms, and little more can be done than give descriptive notes. A good sludge should be chocolate brown in colour, free from appreciable smell of an offensive nature, and when quiescent should settle within 15 minutes. The supernatant liquid should be clear and non-colloidal, and on analysis should show nitrification. If nitrates are present the sewage has been well blown: a well blown sludge under the microscope is found to be full of bacteria and to contain a few protozoa. Among the bacteria present, those that form nitrates and nitrites are the most important, and should number 100 or more per cc. of the effluent.

When the sewage is underblown, either because the capacity of the tank is too small to allow a sufficient period of aeration, or because of mechanical trouble, or obstructions in the diffusers, the sludge deteriorates. It gives off an offensive smell, changes from a chocolate to a dark black colour, and takes a very long time to settle. At the same time the supernatant liquid, instead of being clear and transparent, becomes colloidal and sticky. Sometimes a sludge assumes a texture known as "ropy," and such under the microscope shows a large growth of protozoa, very sluggish in movement, and not so active as those in a healthy well-blown sludge. Unhealthy sludge may temporarily

produce a satisfactory non-putrefactive effluent, but if the cause of the deterioration is not removed, a serious breakdown of the whole process will occur.

When the sewage is overblown, which occurs when the quantity to be treated is too little for the tank, the sludge burns out and diminishes in volume, and the effluent becomes colloidal.

It has been established that there is a minimum and a maximum period of aeration for any particular sewage. There is also a minimum and a maximum percentage of sludge to be introduced in the sewage if a stable and clear effluent is to be obtained. Each sewage will require separate consideration and will demand its own appropriate treatment in the above respects, but in both relations there is a wide margin within which good results will be obtained. In the case of the Jamshedpur sewage it was found after experiment that the volume of sludge to sewage could vary between 10 and 20 per cent.

As to the period of aeration the time was gradually reduced under careful observation until the aeration period came down to 6 hours. This factor will again vary according to local circumstances, and must be determined for the particular sewage to be treated.

Some experiments were made on drying sludge in the sun. It was found to dry very well on turf provided the depth of the sludge layer did not exceed 3 inches. Drying on sand was found unsuitable because, though the sludge dried rapidly, it penetrated the upper layers of the sand, which became incorporated in it, thereby lowering the percentage of nitrogen per volume of dried sludge. A 3-inch layer of sludge dries on turf to a spadable condition within 6 hours, and within 24 hours it is quite dry in flakes, varying from one-twelfth to one-eighth inch in thickness which can be easily handled. In 3-inch layers it dries well on a cement floor. Dried sludge has been kept for a period of two years in a stoppered bottle without showing any signs of deterioration or developing an offensive smell. The value of the dried sludge as a fertilizer has been amply demonstrated by carefully observed experiments extending over two years.

Anyone considering the installation of an Activated Sludge method of sewage disposal in the tropics will gain much useful information from a study of the paper in the original.

**FOWLER (Gilbert J.).** *The Activated Sludge Process in India and the East.*—*Trans. of the Internat. Conference on San. Engineering.* The Institution of Sanitary Engineers. London. 1924. pp. 122-125.

East of Suez there are, it is believed, installations in operation only at Jamshedpur near Calcutta, at the Indian Institute of Science in Bangalore, and in Shanghai. The plants are all designed on what is known as the "diffused air" system. There are proposals for the installation of similar types of plant in other parts of the world, for instance, at Hankow, the Federated Malay States, etc.

**Jamshedpur.**—

The installation is designed for 3,000 people at 38 gallons per head, giving a dry weather flow of rather more than 100,000 gallons per day. The tanks are arranged to give six hour's aeration in three units, each designed to deal with 50,000 gallons on the basis of six hour's aeration, thus giving a margin of 50,000 gallons over the dry weather flow of 100,000 gallons. From the first the works have given excellent results, though they have regularly received more sewage than they

were designed to treat. The sludge and effluent have been used to irrigate what was practically desert land, and some 40 to 50 acres have been brought under luxuriant cultivation, the chief crops being market produce and sugar cane. The land, originally of a barren sandy nature, has acquired a good tilth.

Indian Institute of Science, Bangalore.—

The installation was designed for 200 people at 30 gallons per head. As a matter of fact about 450 persons contribute to the sewage which should reach the tanks, but chemical analysis indicates that only a certain proportion of the urine enters the sewers. The plant has been used for experimental work of various kinds, and the conditions have been made at times purposely unfavourable, particularly in regard to the air supply. Inadequate air supply has been found to be the cause of many difficulties. It is possible, for a certain period, to obtain quite a good effluent with about half the amount of air which experience has shown to be necessary. Under such conditions, in the course of time, banks of unoxidized sewage form, and the quality of the effluent deteriorates rather suddenly, "bulking" of the sludge takes place, and the whole process is disorganised. Moreover, insect larvae, particularly of *Chironomus*, appear in quantity in the slowly moving sludge and completely alter its physical characteristics. With an adequate supply of air none of these troubles arise, and an excellent effluent is constantly obtained. "Bulking" has been found to be due to filamentous bacteria rather than to protozoa, though numerous forms of the latter may be present. The experiments have been of great interest as showing the close analogy between the forms in activated sludge and in arable land, and their variation with conditions of aeration, temperature, and season. The effluent and some of the sludge have been used for irrigation purposes and excellent crops of cabbages, chillies, vegetable marrows and other market produce have been raised on what was formerly jungle land. No nuisance of any kind has arisen either from the tanks or the irrigation area. It has been found that the routine oversight of the plant can be entrusted under general instructions to illiterate Indian subordinates.

Valuable experimental work has been done on the fermenting together of leaves and house refuse and activated sludge, with the production of an excellent manure rich in humus. Certain conditions for success have yet to be worked out in detail, but there is good reason to hope it will be possible to solve at once the problem of disposal of activated sludge and of house refuse.

Shanghai.—

The City has been accustomed to receive a revenue of £40,000 per annum by the sale of night soil; nevertheless, under the closely packed conditions of a modern city, an insistent demand arose for a water carriage system. It has been decided to construct three disposal works on the activated sludge system. The works for the central area are in the course of construction, and the first set of aeration and sedimentation tanks were completed in 1923 and put into operation with satisfactory results. It appears that the Chinese cultivator willingly makes use of activated sludge as a fertilizer.

In conclusion, it may be stated without hesitation that the activated sludge process has shown itself applicable to tropical conditions, both for large towns and for small communities, and the hope may be expressed that it will play its part in the increasingly difficult problem of food supply for the large and increasing populations of the East.

By the adoption of the activated sludge process as a preliminary to land treatment it has been demonstrated that sewage farms may be established without nuisance and with the least loss of the manurial value of the water-borne sewage.

BOLTON (Joshua). **Elasticity of the Activated Sludge Process.**—*Trans. of the Internat. Conference on San. Engineering.* London. 1924. pp. 116–121.

Experiments were carried out, not with the idea of scientific research, but to see how the process would behave under rough usage. Small authorities may not be able to pay for highly trained managers, and it is probable that non-technical men may be in charge of small works and the care bestowed not all that could be desired. Such a state of affairs is likely to occur in the tropics, and any evidence as to power of withstanding improper treatment is of particular interest from this point of view.

The experiments have demonstrated that the process is a very elastic one and that it will withstand shocks, which ought not, but may, be applied to it.

The plant subjected to experiment was that at Bury, Lancs. Owing to circumstances not under control, it so happened that on one occasion the power supply was cut off for a period of four days. Anxiety arose as to what would happen to the sludge. The water in the aerating and settling areas remained clear, and when power was available after the four days' stoppage, the plant was put in action and the contents circulated for three hours. A little odour was noticed at the start, but this rapidly disappeared. Sewage was turned into the tanks and good results were obtained immediately. It is considered that sewage might have been admitted at once, without the three hours' circulation and aeration, and good results would have been obtained.

As it appeared wasteful in power to have the machines constantly working during periods of low night flows, and experience had shown that a lengthy stoppage did not jeopardize the process, it was arranged to have one of the tanks shut off for a period of eight hours each night. The results, instead of deteriorating, were actually better. This was confirmed by analyses covering a period of eleven weeks, during which the flow and the machinery was stopped for a period of eight hours each evening.

Experiments were made of the simple contact of activated sludge with sewage, crude sewage being taken and placed in a vessel containing 15 per cent. of activated sludge in an active condition. After being well mixed the sludge and sewage were allowed to stand for one hour to enable the sludge to settle. Analyses showed that remarkable purification takes place by simply mixing the sludge and sewage together without aeration or agitation other than necessary to distribute the sludge in the sewage. When a tank is in operation and the power is shut off, the suspended sludge gradually settles to the bottom and is doing effective work during the whole of its travel down through the liquid in the tank. There is, moreover, evidence to show that when a tank is stopped and after the sludge has settled to the bottom, purification is still taking place.

On one occasion whilst the surplus sludge was being drawn off, a mistake was made and an excessive amount of sludge was abstracted,

which reduced the quantity in the tank to below 5 per cent. Instead of the results falling off as might have been expected, they remained constant, and the plant was worked for a period of six weeks with 5 per cent. only of sludge. The results as shown by analyses were satisfactory. Experiments to ascertain how long sludge could be kept without aeration before becoming foul showed that six days elapsed before an offensive odour was developed.

**GUTTERIDGE (A. Gordon.). Memorandum regarding the Utilisation of Sea Water as the Transporting Medium in a Sewage Installation.**

—*Jl. Roy. San. Inst.* 1925. July. Vol. 46. No. 2. pp. 42-46.

It has often been suggested that salt of brackish waters could be advantageously utilized as a flushing and transporting medium in a sewerage system, but uncertainty as to the effect that the salt would have on the sewage matter and on the operation of the sewage works has so far hindered the widespread adoption of this suggestion.

The problem as to utilization of sea-water as a transporting medium depends upon the following questions :—

*The Action of Sea-water on Pipes, Fittings, etc.*

It may naturally be expected that the corrosive action will be greatly increased over that occurring when fresh water only is employed. This corrosion will be particularly active during the earlier days of flow, but will decrease progressively as the interior of the pipes become covered with a protective coating.

The most serious corrosive action will occur in those metal fixtures and pipes the surfaces of which are alternately wetted and exposed to the air, such as the flush tank together with its ball, syphon, etc., and the down pipe to the closet pan. Corrosion will be especially marked at those junctions where two different metals come in contact owing to the electrolytic action induced by the sea water. This difficulty may be most easily overcome by moulding these fixings out of cement, or by coating all the exposed metal surfaces with cement or cement paint. As the pan, house drains and sewer lines are usually made of earthenware no corrosion in these will take place.

*The Transporting Power of Sea Water.*

Water which is strongly saline will not transport as much matter in suspension as will water that is not salt. Provided, however, that the sewers are laid with sufficient fall to give a velocity to the sewage of at least 3 ft. per second, and ample water is allowed for flushing, this factor is of no great moment.

*The Action of Sea Water on the Sewage Solids.*

Chemical action takes place between the salt in the water and the organic solids of the sewage, but continued experiment has failed to show that this reaction has any tendency to cause the sewage solids to assume a form in which they are more resistant to change than if fresh water is in use.

A much more important matter is brought about by the throwing out of solution of grease in a liquid or a semi-solid condition passing into the drains with kitchen waste. The reaction produces a marked scum on the top of the sewage and forms a thick and resistant coating to the inside of the sewers. The decomposition of this coating is

undoubtedly liable to give rise to offensive odours arising from the drainage system unless it is exceptionally well ventilated. The carrying capacity of the sewers will also undergo a steady diminution unless they are frequently cleansed.

At the treatment plant this scum tends to form a heavy and odoriferous layer on the surface of any tank and to choke all exposed openings and connections, leading to clogging of the plant.

The obvious remedy is to prevent the admission of the grease to the underground drainage system by the provision of adequate grease traps. Such are, however a continual source of trouble unless they receive constant attention for cleansing, and provision is made for the proper disposal of the grease that is removed. Traps may be installed on each house drain or at some point on the outlet sewer, when the trouble to be expected from this grease will be confined to the reaches of sewer above the points of installation.

The impression that over-polluted sea water becomes more offensive than fresh in the same condition may be well founded, since sulphides, and possibly organic sulphur, have been found in sea waters when over-polluted. As, temperature for temperature, the dissolved oxygen content of sea water is approximately 20 per cent. below that of fresh water, this would seem to indicate that putrefaction of the sewage will occur sooner with sea water as a transporting medium than if fresh water be used. The quantity of odoriferous gases given off during putrefaction will also be decidedly increased. If well aerated sea water be utilized in the first instance for the flushing of the closets, the time interval allowed by English authorities before putrefaction can take place is stated to be 10 hours.

#### *The Action of Sea Water during the Process of Sewage Treatment.*

The view is generally held that the salt or other constituents of sea water, while having a somewhat deterrent effect upon aerobic action, have on the other hand the effect of greatly increasing the numbers and the activity of anaerobic bacteria. Under anaerobic conditions, therefore, it may be expected that action will proceed more rapidly once it has been established, though some delay may occur owing to the protective coating given to the solids through the interaction of the salt and organic material. Aerobic action will undoubtedly be delayed, both on account of the lessened number of aerobic bacteria and by the smaller amount of oxygen available in a dissolved state in sea water. Additional burden will be thrown on the filters on account of unconverted ammonia compounds in the sea water which will undergo oxidation together with the sewage compounds.

On the other hand, sea water possesses the property of rapidly transmitting dissolved atmospheric gases from the surface of the liquid exposed to the air to those portions further removed.

Any difficulty that may be experienced from decrease of bacterial efficiency in the filter bed may be met by a decided increase in the area of the bed and a consequent diminution in the rate of application to it of the sewage liquid.

In conclusion, it is considered that sea water may be safely used as a transporting medium in a sewage installation under the following conditions :—

“(1) Where a cement is used as far as possible for all surfaces of fittings, etc., exposed to alternate ‘wind and water’ action.

" (2) Where the grades of the sewers are such as to secure a thorough scouring velocity.

" (3) Where the grease content of the sewage is removed by suitable traps.

" (4) When the period during which the sewage is undergoing transportation to the treatment works is such that the total depletion of the oxygen dissolved in the liquid is impossible.

" (5) When the treatment works are so located that the additional odours arising from decomposition of the sewage solids in the presence of sea water, will cause no nuisance.

" (6) When the volume of the filter bed is suitably increased.

" (7) When the effluent from the filter bed can be rapidly diluted in some larger volume of well-aerated waters."

It is recommended that some form of sedimentation basin in which the deposited solids are allowed to digest out of contact with the supernatant liquid from which they were originally deposited will lead to more effective treatment. The Imhoff tank or some of its later variations should meet this recommendation.

In Malta two small installations employing sea water have been in use for the past 20 years and have given satisfaction.

Ross (G. A. Park). **Fly-Proof Latrines for Coloured Persons.**—*Jl. Trop. Med. & Hyg.* 1925. June 15. Vol. 28. No. 12. pp. 231-232. With 2 text figs.

The author finds that the essential element in promoting cleanliness is to have some portion of the latrine coming up between the legs and close under the buttocks, and also that when the latrine keeps itself clean there is no difficulty in enforcing its use always provided it is easy of access and close up to the coolie lines.

Illustrations are given of pail pattern and of a privy-pit pattern.

In each case the receptacle projects some  $4\frac{1}{2}$  inches above the floor. In the triangle pit privy pattern the aperture is 21 inches from back to front, 3 inches in front and 18 inches behind. The following instructions are usually sent out with this type :—

(a) Pits to be made in dry soil to a depth of 10 feet or over. The bacteriolytic action which goes on in a deep pit is very effective and such lasts for many years without having to be filled up.

(b) The pit must be completely covered over to prevent access of light. Flies will not penetrate a dark pit.

(c) A few spade-fulls of rich leaf mould thrown over the initial deposits of stercus are an advantage in setting up a desirable decomposition.

(d) In a large installation a urine trough leading to a separate pit is recommended.

(e) Di-chlorbenzol, a crystalline preparation (made by Messrs. Kynoch, Ltd., Umbogintwini, near Durban) gives off a heavy gas which is a perfect deodorant. A quarter of a pound of this hung inside the pit keeps the latter full of gas, which kills any smell and through which flies cannot penetrate.

(f) Should a pit become flooded it must be filled with earth above floor level and some oil waste might be set to smoulder while it is drying out. This will prevent any smell.

(g) No disinfectants should be used.



The author states that he has found it useless to arrange for self-closing lids. Natives simply put a stone under the hinge which is wrenched off as soon as anyone attempts to shut it down.



Fig. 68.—Type of pit privy, designed by Dr. A. A. Park Ross, largely used for coloured persons in Natal.

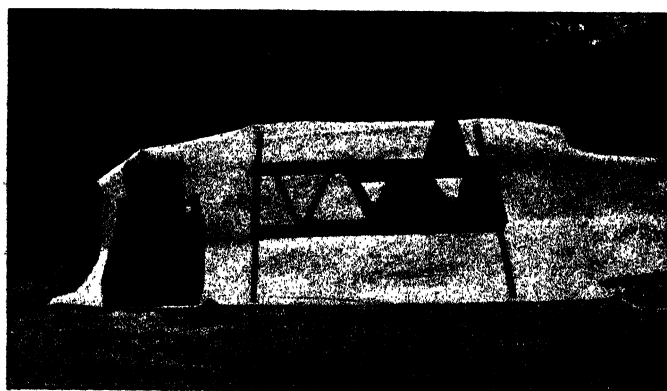


Fig. 69.—Photograph to illustrate the construction of a pail pattern latrine and the pit privy pattern, designed by Dr. Park Ross.  
[Reproduced by permission from the *Journal of Tropical Medicine & Hygiene*.]

## DISINFECTION.

KING (H. H.). **The Stability of Solid Calcium Hypochlorite.**—*Indian Jl. Med. Res.* 1925. July. Vol. 13. No. 1. pp. 191–194.

It is desired to bring to the notice of the English-speaking world a substance, solid calcium hypochlorite, whose advantages as regards concentration and stability seem to be at present most appreciated in Germany, where the material is manufactured. By calcium hypochlorite is meant a salt in which *both valencies* of the divalent calcium atom are satisfied by hypochlorite radicles, and which would thus have the formula  $\text{Ca} \begin{smallmatrix} \text{OCl} \\ \text{OCl} \end{smallmatrix}$ . Whatever may be the real constitution of bleaching powder, the formula is fairly accurately expressed by  $\text{Ca}(\text{OCl})\text{Cl}$  plus a varying amount of lime. Theoretically, therefore, solid calcium hypochlorite can have almost double the available chlorine strength of bleaching powder, and more than double, if there be but little lime present with the calcium hypochlorite as compared with the 33 per cent. or more present in "bleach." Thorpe's Dictionary of Applied Chemistry stated that it was made in Germany under certain patents and described it as a crystalline solid that contained 80 to 90 per cent. of available chlorine and that it was reputed to be stable.

Tins of the compound were received in Kasauli in January, 1924, and tests showed an available chlorine content of 74.4 per cent. The following examinations to test the stability were made. Five small glass stoppered bottle were half filled with calcium hypochlorite and the stoppers waxed down. The first (A) was put in a wood box and kept in an ordinary room cupboard. The second (B) was put in the dark into an incubator at 37° C. for 66 days, then in a box in a cupboard for 174 days during the hot weather, then put back into the incubator for 67 days. The third (C) was put on a shelf exposed to indirect light. The fourth (D) was shaken by a vaccine shaking machine for about 6 hours a day on 12 days in the first month after which it was put in a cupboard. The fifth (E) was put in a wood case open at the top and was left unstoppered on a shelf. At the end of 10 months the final readings for available chlorine were as follows :—

(A) Cupboard in the dark ... ..	67.7 per cent.
(B) Incubator 4 mths., cupboard 6 mths.	56 "
(C) Exposed to light ... ..	66.7 "
(D) Exposed to vibration ... ..	67.7 "
(E) Exposed to air ..... ..	24 "

The only factors that had any effect of note were heat and exposure to the air, but the latter is not a legitimate treatment. Seeing that it is very unlikely that the conditions of storage, so far as the effects of temperature is concerned, in any station in India over 10 consecutive months would be more severe in total effect than the conditions in experiment (B), it may be said that the deterioration there found probably represents the maximum deterioration likely to be obtained anywhere in India in 10 months.

Similar tests carried out with "bleach" stabilized with lime and "bleach" not so stabilized showed for the first-named a loss of strength corresponding more or less closely with the above, but in the case of

unstabilized "bleach" the resulting loss was very marked. By comparison both stabilized "bleach" and calcium hypochlorite are very stable substances to ordinary "bleach." It is considered that there is little doubt that the chief reason for the superior stability of these two substances is their dryness. Attention is drawn to the containers in which the calcium hypochlorite was packed; the tins were airtight through the use of a washer round the lids, and were painted with bituminous paint, thus preventing the deleterious catalytic action of rust.

Apart from its high content of available chlorine, this preparation of calcium hypochlorite has a distinct advantage over bleaching powders in that the proportion of free lime and extraneous matter is very low, so that a solution in water gives very little sediment. This property is of peculiar value in the chlorination of drinking water.

It is considered that the advantages of solid calcium hypochlorite are very great, it presents a disinfectant containing a very high percentage of available chlorine in a stable form, and requiring comparatively little consideration in transport, as it is on the average three times as strong as "bleach."

LAL (R. B.) & TIWARI (C. D.). **A Note on the Disinfestation of Houses by Fumigation with Cresol.**—*Indian Med. Gaz.* 1925. June. Vol. 60. No. 6. pp. 255-258.

The method in vogue in the Punjab for the disinfestation of houses for plague is by vaporizing commercial cresol on smouldering cow-dung cakes. Two ounces of cresol have been recommended to be used, and under instructions from the Director of Public Health an enquiry into the efficacy of the procedure was undertaken in August, 1924. The points studied were :—

The effects of fumigation of varying amounts of cresol on rats and on rat fleas in masonry and in mud houses; the fleas being :—

- (a) In muslin bags; either directly exposed to the vapour or more or less protected.
- (b) On living rats.
- (c) Free in the room.

The following conclusions were arrived at :—

1. Cresol fumigation as ordinarily carried out has no effect upon rats, but has a definitely toxic effect upon fleas when either in muslin bags, free in the room, or on the bodies of rats. Two ounces of cresol is quite insufficient for ordinary rooms of 1,000 to 1,500 cubic feet capacity.

2. Household furniture and rat-runs afford effective protection to the fleas against the action of the vapour even when cresol is used in large quantities.

3. Fumigation with cresol tends to cause fleas to leave their hosts.

4. The toxic action of cresol vapour is more manifest at higher levels as compared with the floor level.

5. Slightly better results are obtained by vaporizing cresol on two heaps of cow-dung cakes instead of on one.

To make disinfestation by means of cresol effective the following recommendations were made :—

1. Remove all the furniture and sundries before disinfestation and thoroughly expose them to the sun.

2. Use 10 ounces of cresol in an ordinary room of 1,000 cubic feet capacity.

3. Preferably distribute the drug over two iron pans containing smouldering cow-dung cakes placed in different parts of the room.

4. It is expedient to arrange some mechanical means to prevent the vapour from directly rising up.

5. It is necessary to seal the room carefully before fumigation and to keep it closed for four hours afterwards.

6. It is expedient to wash the floor with phenyl solution after the disinfestation is over.

7. After disinfestation is completed, rat runs should be fumigated with *neem*-cartridges [see page 189] and then closed.

Without the help of the usual staff and under the rural conditions in the Punjab it would not always be possible to carry out these recommendations.

JUILLET (A.) & DIACONO (H.). **Emploi des extraits de "*Pyrethrum cinerarifolium* Trev." dans le traitement de la pédiculose du corps (*Pediculus corporis* de Geer).**—*Bull. Acad. Méd.* 1925. July 7. Year 89. 3rd Ser. Vol. 94. No. 27. pp. 778-779. [2 refs.]

The toxicity of extracts of pyrethrum for a variety of insects and their harmlessness to man have suggested their employment in pediculosis. Soapy suspensions of the extracts used at the first trials had but little action upon the louse and its eggs. If, however, the proportion of extract is made as high as 0.25 gm. per 100 cc. of the soap solution with 0.88 gm. of ethyl trichloride in addition, the effect is excellent.

Extraction should be effected by means of ethyl trichloride, and not by ethyl alcohol, ether, petroleum ether, or carbon tetrachloride. Extraction by percolation in the cold is of no value, as the extracts thus obtained are inactive. The soap used should always be one containing potassium in small amount and only slightly alkaline, so as not to destroy the activity of the pyrethrum. Soap containing soda should not be used. Potash soap and ethyl trichloride are by themselves quite without action, but they assist in clearing the chitinous cuticle of the louse and thus facilitate the penetration of the pyrethrum extracts.

The most suitable period of contact with the louse or its nits is 20 minutes. Under these conditions, *in vitro*, an aqueous solution (containing 16 gm. of a potash soap, 0.25 gm. of dry pyrethrum extract, 0.88 gm. of ethyl trichloride per 100 cc.) absolutely secures the destruction of lice and nits.

Twelve individuals detained in the civil prison at Sousse (Tunis) all heavily infested with body and head lice and nits were treated with the above compound. Their clothes were washed in the soap-suspension and returned to the people after having been dried. No reinfestation was evident four weeks after treatment though the men were kept under observation and examined daily.

It is considered that pyrethrum extract as above compounded should prove a valuable agent for the prophylaxis of typhus and other maladies transmitted by means of the louse.

## CHILD WELFARE.

HONE (Frank S.). **Review of the Present Position of Infantile Mortality.**  
—*Med. Jl. Australia.* 1925. May 2. 12th Year. Vol. 1.  
No. 18. pp. 443-449. With 11 charts in text.

Reviewing the course of events during the past quarter of a century the following propositions are put forward :—

1. There has been a very marked and for the most part a steady improvement in infant mortality.

2. Closer inspection of figures shows that this improvement has been almost entirely confined to the period of infancy later than the first month of life and has been due to a greater control of post-natal environment, especially with regard to the infections of the intestinal tract and to nutrition. Infections of the respiratory tract apparently remain constant.

3. Experience has shown that no one method is a cure-all, but that success depends on close attention to all the details of a child's life.

4. The mortality figures for the first month have remained practically unaltered ; any change has been, if anything, for the worse.

5. The causes of death in this early period differ from those in the latter period : the important factors are pregnancy and the puerperium, whereas in the second period they are food and flies.

6. The method of successful attack in the two periods must, therefore, be entirely different.

7. For the same definite advance in the reduction of mortality in the first year of life to be made during the next quarter of a century as has been made in the past, we must cease to think of infantile mortality as one subject, and rather think of : (a) Birth or natal mortality, including in this ante-natal and neo-natal factors ; (b) post-natal mortality.

If deaths in the first month of life are further analysed, it is found that the great majority occur in the first week ; their causation is therefore natal or ante-natal. Investigation shows that the two great factors at work are syphilis and slovenly obstetrics. The main causes of death in this period are prematurity, congenital debility, malformations and accidents of childbirth.

The influence of various conditions on the early deaths of infants is shown in the following table, according to Dr. Whitbridge WILLIAMS, in the United States :—

Complications of labour (including ante-partum hæmorrhage and post maturity of the foetus) ... ..	51 per cent.
Syphilis ... ..	16 "
Toxaemias of pregnancy ... ..	10 "
Chronic renal and other maternal diseases ... ..	2 "
Placental states leading to relative placental insufficiency ...	6 "
Foetal deformities ... ..	5 "
Cause of death unknown ... ..	11 "

For the purposes of preventive treatment foetal deaths may be classified into four groups :—

(1) Those, the cause of which can be discovered during the ante-natal period and can be prevented by purely ante-natal treatment.

The great representative is syphilis; other examples are toxæmia of pregnancy and breech presentations.

(2) Those, the causes of which can be discovered during the ante-natal period, but which depend for their prevention on intra-natal methods. The best example is contracted pelvis; other examples are the toxæmias of pregnancy which do not yield to ante-natal treatment and (rarely) obstructive pelvic tumours.

(3) Those, the discovery of which is not possible in the ante-natal period, but which make their presence known just before or coincidently with the onset of labour or during the course of labour. Examples are the ante-partum hæmorrhages (a prolific cause), prolapse of the umbilical cord and cases of prolonged labour from such causes as persistent occipito-posterior presentations. In this group most of the foetuses have cerebral hæmorrhages and tearing of the septa of the dura mater consequent on delivery by forceps or version.

(4) Those of which the causes so far as our present state of knowledge stands, are not discoverable or preventible by any means whatever.

It is thus conceivable that about one-half the foetal deaths are preventible; that of these about 20 per cent. (of which three-quarters are due to syphilis) could be prevented by ante-natal methods alone, about 12 per cent. depend for their prevention on combined ante-natal and intra-natal methods and about 20 per cent. on intra-natal methods alone.

PEIRIS (S. J.). *La mortalité infantile dans l'île de Ceylan.*—*Bull. Internat. Protection de l'Enfance.* 1925. June 30. No. 38. pp. 583-589.

The following table gives the mean for the years 1914-1923 of infantile mortality for Ceylon, compared with England:—

	Birth Rate per 1,000 inhabitants.		Infantile Death Rate per 1,000 inhabitants.	
	Ceylon.	England.	Ceylon.	England.
Mean for the 10 years ...	38.5	20.2	192	89

The number of deaths in the first year of life is more than half the total number of deaths among children up to five years of age.

The principal causes of infantile mortality during the current year were as follows:—

Causes.	Children under one year, percentage of deaths.
Convulsions ... ..	29.7
Debility ... ..	18.7
Prematurity ... ..	5.1
Diarrhoea and Enteritis ... ..	2.2
Bronchitis ... ..	1.0
Pneumonia ... ..	2.1
Tetanus ... ..	0.1
Other causes ... ..	40.8

As regards the regional distribution of infantile mortality, the Island was divided into three sections:—

1. The Urban Section, comprising the 33 principal towns and their suburbs.

2. The Estates, comprising plantations in which the inhabitants are mainly made up of European planters (in small number), of immigrant agriculturists and coolies who constitute the majority of the population.

3. The Rural Section, comprised of villages occupied by a rural indigenous population.

In the first two sections statistics could be accepted as accurate, but in the Rural areas they could not be so regarded owing to the paucity of medical men and the consequent inaccuracy of diagnosis.

In the principal towns, debility, convulsions, prematurity and gastro-intestinal ailments were the principal causes of infantile mortality, to which it is considered that artificial feeding contributes very largely.

In the estates more than one-half of the infantile deaths were due to debility, and the cause of this is held to be the poverty of the agricultural population. Convulsions and gastro-intestinal ailments were less in evidence than in the cities.

Convulsions following intestinal trouble was the main cause of death in the villages of the Rural Section.

An analysis as to the influence of race on infantile mortality resulted in the following :—

Death Rate per 1,000 of infants under 1 year of age :—

Nationality.				Average of five years.
Europeans	...	...	...	47
Bughers and Eurasians	...	...	...	145
Cingalese	...	...	...	176
Tamils	...	...	...	234
Moors	...	...	...	243
Malays	...	...	...	218
Other Races	...	...	...	194

VANDENPERRE (L.). **Les enfants indigènes au Congo Belge.**—*Bull. Internat. Protection de l'Enfance.* 1925. June 30. No. 38. pp. 539-555.

Infantile mortality is very heavy among native children in the Belgian Congo. In infants below 18 months of age the figure averages from 50 to 80 per cent., so far as it is possible to obtain statistics. Owing to the lack of care and precautions and to measures of abortion prenatal mortality also is excessive.

The native woman is a good mother ; she has the advantage of the white woman in that she is able, except in very rare cases, to feed her own child, which she frequently does until it is two or even three years old ; but she is devoid of all hygienic knowledge and care in the management of her first born, and she prefers the ignorance of fetich to the scientific advice of the European doctor.

The remedy for this state of affairs lies in education and instruction under the direction of an European woman, and the outlook is encouraging.

A statistical study of the diseases of children in the country and extracts from the reports of the Third International Colonial Congress at Ghent are appended.

## INDUSTRIAL HYGIENE.

INTERNATIONAL LABOUR REVIEW. 1924. Dec. Vol. 10. pp. 1005. 1028.—[**Labour Conditions and Labour Regulation in China.**] [Summarized in *Jl. Indust. Hyg.* 1925. June. Vol. 7. No. 6. p. 108.]

On the eastern border of China factory regulations and inspection are undeveloped, and the conditions of child labour are far from satisfactory. In Shanghai children are not infrequently worse off in the modern factories than in their native homes. Tuberculosis amongst them is prevalent. Purchase of young female children for domestic service is of common occurrence, and apprenticeship in small workshops at an early age is frequent. The conditions under which these children work may vary between virtual slavery and humane employment. In mills and factories children of not more than 6 years of age are at work for 12 hours a day with one hour off for a meal. Sanitary conditions are deplorable and wages exiguous. Mothers working in factories often bring their infants with them, and rows of baskets containing babies are to be found between pieces of rapidly moving machinery. White phosphorus is still used in certain match factories and cases of poisoning result. In laundries girls and boys start work at 13 years of age; the hours of work are unlimited, from dawn often until late at night.

CHEN (T.). [**Labour Conditions in China.**].—*U.S. Month. Labor Rev.* 1924. Nov. Vol. 19. pp. 980–993. [Summarized in *Jl. Indust. Hyg.* 1925. June. Vol. 7. No. 6. p. 109.]

In the Yangtzepoo District, Shanghai, foreign mill owners in the cotton industry have established a free hospital and dispensary for their 15,000 employees. 55 per cent. of the workers are women and 20 per cent. children. Owing to the nature of the cotton industry most of the injuries are lacerations, 75 per cent. of which become infected. Accidents are most frequent among children, for they are inexperienced and tire easily under continuous employment. The trend of legislation is (1) the prohibition of children under 12 years of age, (2) one day's rest in seven, (3) the limitation of working hours.

BOUFFARD (G.). **Protection sanitaire de la main-d'oeuvre indigène en Côte d'Ivoire.**—*Bull. Soc. Path. Exot.* 1925. May 13. Vol. 18. No. 5. pp. 439–442.

According to the nature of the work required by the employer it follows that manual labour varies considerably; the class of labour may be relegated to several categories.

1. Administrative manual labour, such as occurs in the service of many public bodies. An important centre exists on the Ivory Coast in the railway workshops for the construction of the line towards Bobo Dioulasso. The railhead is at Katiola, where 1,800 native workmen are stationed. Medical attention is assured by the presence of an assistant surgeon and new workmen are examined on arrival and



on leaving. On arrival, those unfitted for the work expected of them are weeded out, and on leaving those with communicable affections are sought out and looked after. The feeding arrangements are made a special study by the medical officer, and the rations are varied as much as possible. Drinking water is often not an easy matter to arrange for; tank-wagons are employed to bring good potable water either proved by examination or purified by chemical treatment.

In August, 1924, out of an effective strength of 1,500 men, 50 admissions to hospital on account of dysentery occurred. This was believed to be of bacillary origin as emetine had no beneficial action.

2. Maritime manual labour consists of Kroo boys recruited for coastal voyages. These men are examined before embarkment and again on being disembarked. The effective strength of the Kroo boys is about 2,500. Every two or three months these men return to their own country, and thus present a constantly changing body liable to spread infection. There is need to organize at Tabou an observation camp sufficiently large to arrest the importation of transmissible affections. Owing to the absence of such an organization Tabou was infected with smallpox contracted on board ship in August, 1924.

3. Manual labour in forest land. This is found in a number of business concerns engaged in the exploitation of the valuable forest woods. Each of these works employ from 3,000 to 4,000 workmen. Recruitment is associated with the Administration, but there is no medical control owing to the paucity of medical personnel. As the majority of the workmen pass through Dimbokro it should be possible to arrange for some medical supervision at this place. On return from the employment the men also pass through Dimbokro. In most of the works first aid on account of sickness or accident can be obtained pending removal to the nearest organized medical depot. The attendants are the private servants of the firms concerned; in other cases attention is given by the Europeans employed in cutting the trees.

PIROW (H.). [**Underground Conditions liable to Affect the Health of Workers in Gold Mines on the Witwatersrand.**—*Jl. Chem. Met. & Min. Soc. of S. Africa.* 1924. Sept. Vol. 25. pp. 54-96. [Summarized in *Jl. Indust. Hyg.* 1925. May. Vol. 7. No. 5. pp. 83-84.]

The author, who is a mining engineer, advocates extended use of a direct vision konimeter by the use of which the amount of dust in the air can be immediately demonstrated. Dust generated in different processes varies so widely that conditions under which an operation is performed are more important than the operation. The only method of precipitating dust after it has gained access to the air is by condensation of water, but this has the disadvantage that it introduces a high degree of humidity in mine workings which are already hot.

Ventilation must be regarded as the chief means of combating the dust evil by sweeping the dust out of the workings. To meet this adequately, a standard suggested is 200 cubic feet of air per drilling machine, exclusive of the compressed air used by the machine. The keeping of live animals underground under varying conditions is advocated, to act as a check on the mechanical tests used.

## REPORTS AND VITAL STATISTICS.

MINISTRY OF HEALTH. **On the State of the Public Health. Annual Report of the Chief Medical Officer of the Ministry of Health for the Year 1924.** [NEWMAN (George).]—266 pp. With 3 charts. 1925. London: H.M. Stationery Office. [Price, 3s. 6d. net.]

In this Report the portions more particularly of interest from the tropical aspect are to be found in Chapter III, "Infectious Diseases of Exotic Origin,"; Chapter X, "Local Sanitation and Environmental Hygiene, including Port Sanitation"; and Chapter XI, "Medical Intelligence, Investigation, and International Health.

As regards Chapter III, the following may be noted:—

*Plague.* In Europe the chief outbreaks during the year were in Greece and in the Ural Provinces of Russia, but there were small groups of cases also in Italy at Naples and Symi Island [off Asia Minor], in France in the suburbs of Paris, in Turkey at Constantinople, and in Crete at the port of Canea. There was a recrudescence in Nigeria, the Azores and the Canary Islands.

In the world generally there is at present no sign that the present pandemic, which began in China in 1894, is on the wane. British India continues to be the most extensive reservoir of the disease; 236,518 deaths were recorded in 1924, and the total mortality officially recorded since 1898 now exceeds eleven millions. In Russia, South Africa and North and South America endemic foci of the disease are increasing as the result of the spread of infection from local rats to wild rodents. Eradication of infection from wild rodents is an exceedingly difficult matter, for in South Africa the development of farming has been accompanied by destruction of jackals, wild cats and snakes, which are the natural enemies of the wild rodents; these have accordingly become exceedingly numerous.

*Cholera.* With the exception of British India the world generally was remarkably free from the disease. So far as can be ascertained no occurrence of cholera on board ship was reported in any part of the world during 1924.

*Yellow Fever.* In the Western Hemisphere the outbreak of greatest magnitude occurred in San Salvador, where there were 63 cases notified between June 10th and November 11th. Though still persisting in Mexico, Honduras, Nicaragua, Colombia and Brazil, the number of cases reported was very small. In the Eastern Hemisphere five cases were reported from French West Africa, eight from the Gold Coast, and two from Nigeria, but the problem still remains to be solved whether the disease diagnosed as yellow fever on the West Coast is the same disease as is diagnosed yellow fever in Central and South America.

*Smallpox.* During recent years it has been difficult or impossible to estimate the significance of the smallpox statistics received from abroad, for, while some countries follow the English practice of including "mild smallpox" in their notifications, others limit notification to cases diagnosed "variola vera." So far as can be judged, during 1924 severe smallpox was not very prevalent in the world generally. In Europe, except in Spain, where 566 deaths occurred in the first nine months of the year, the incidence of the disease was

relatively low. In Asia the chief epidemics were in China, at Hong Kong, Canton, and Hainan Island, and in the Dutch East Indies at Padang and Sourabaya. Except in Algeria and Egypt, Africa generally showed a decreased incidence. In Canada there was a sharp outbreak of 60 cases with 20 deaths, at Windsor, during February.

*Typhus Fever.* Eight cases were notified during the year, all in the County Borough of St. Helens. In the world generally, and in Europe particularly, the disease was much less prevalent during 1924 than in any year since the war.

*Malaria.* Four new indigenous cases of malaria were notified in England and Wales during 1924 as compared with three in 1923. One of the cases was that of a baby whose mother contracted malaria in Italy and suffered a relapse about the time of the birth of the child. It was considered by the attending practitioner that the baby may have acquired the infection directly from the mother without the intervention of mosquitoes.

*Leprosy.* During 1924 three cases of the disease, all originating abroad, came to official notice in England and Wales.

*Dysentery.* Only 15 cases of bacillary dysentery were notified during the year. The progressive decline, since the war, of dysentery as a whole is shown in the table below :—

1919.	1920.	1921.	1922.	1923.	1924.
1,657 ...	1,253 ...	1,223 ...	789 ...	484 ...	388

*Trench Fever.* The gradual disappearance of this post-war disease is shown by the following figures : 99 cases in 1919, 39 in 1920, 15 in 1921, 6 in 1922, 3 in 1923, and 3 in 1924.

In Chapter X the main interest from the tropical point of view centres round port sanitary control. The aims and objects of port sanitary administration are detailed.

Eight cases of ship-borne smallpox were intercepted at the following ports : Plymouth (3), Bristol (1), Liverpool (1), Hull (1), Southampton (1), and Swansea (1). In none of these port sanitary districts did any spread of the disease result from their invasion by smallpox. Two vessels arrived at the Port of London having had an unusually large number of cases of malaria during the voyage from Bombay ; on the s.s. " Macedonia " 40 cases, and on the s.s. " China " 46 cases were under treatment during the passage.

In seven of the principal ports 868 vessels reported the presence of infectious disease on board either on arrival or during the voyage. The list of diseases thus reported included cholera, plague, smallpox, malaria, sprue, tropical abscess, beriberi, enteric fever, diphtheria, scarlet fever, tuberculosis, venereal disease, etc. There is no evidence to show that any infectious disease obtained a foothold in this country through the ports.

More than 60,000 inspections of vessels of all nationalities for general sanitary purposes were made in these seven ports alone, and defects were found in approximately 12 per cent. of cases.

In these seven ports over 90,000 rats were destroyed by official agencies, in addition to a very large number by private agencies. Further, at these seven ports, 15,000 of the rodents were examined for the presence of plague ; this was not found in any instance.

As regards the medical inspection of aliens, a few cases of infectious disease (including enteric fever, scarlet fever, mumps and measles)

were discovered. These aliens were permitted to land on condition that they entered an isolation hospital and remained there until free from infection.

Amongst the subjects dealt with in Chapter XI is international health work. Reference is made to the activities of the Office International d'Hygiene Publique and of the Health Organization of the League of Nations, and the association of members of the Ministry with these bodies is mentioned.

**LEAGUE OF NATIONS. Health Organisation. Epidemiological Intelligence No. 9 : Statistics of Notifiable Diseases for the Year 1924.**—151 pp. With 8 maps & 10 charts. Geneva. June. 1925. [Price 3s. 6d.]

The statistics cover those for 29 European countries, 17 African countries, 20 American countries, 16 Asiatic countries, and for Australia.

Pages 3–85 contain notes on the prevalence of Notifiable Diseases in 1924, illustrated by maps in the more important cases. The remainder deals with the statistics, as shown by tables, of the notifiable diseases for the countries above detailed.

The work is a valuable encyclopaedia of the subject with which it deals and an accurate reference volume for those concerned in matters of public health.

**WINSLOW (C. E. A.) & KOH (Z. W.). The Mortality of the Chinese in the United States, Hawaii, and the Philippines.**—*China Med. Jl.* 1924. Nov. Vol. 38. No. 11. pp. 877–899. With 11 figs.

The crude death rate of the Chinese in the U.S.A. is very high (27.1 per 1,000 for California, Oregon and Washington in 1919–20, against 12.4 for the total population of those States). This is largely explained by the abnormal age distribution of the Chinese in the U.S.A. Standardization, on the basis of the standard million of England and Wales in 1901, reduced the Chinese death rate to 20, and that for the total population of the three States to 11.4.

The crude mortality for the Chinese in Manila City is much lower than in the U.S.A., and in Hawaii is lower still, being in both places intermediate between that for the local Caucasians and the native races.

In all three regions analysis consistently reveals an—apparently characteristic—excessive mortality among Chinese from tuberculosis, from diseases of the circulation, and from urino-genital diseases, as compared with Caucasians. An excessive mortality from acute respiratory diseases and from external diseases which is apparent among Chinese in the American coast States is not observed in Hawaii and Manila.

A. A.

**MEDEDEELINGEN VAN DEN BURGERLIJKEN GENEESKUNDIGEN DIENST IN NEDERLANDSCH-INDIË. 1924. Pt. 5. pp. 363–460. With 1 folding chart.—Yearly Report of the Civil Medical Service in the Dutch East Indies for the Year 1922.**

The strength of the Service during the year was 140 Government Medical Officers, including those in Mental Hospitals, Department for the Prevention of Plague and Administrative Departments.

In the school year 1921-22, 9 Indians qualified as medical men and 7 Indian officers entered government service, making a total of 190 Indian and Javanese medical officers engaged.

As regards diseases: Influenza appears now to have exhausted itself; malaria figures increased in Mid-Java and East Java; in the Wonosobo division plague was prevalent; and dysentery, and to a less extent smallpox, were present in the divisions of Lampongs, Palembang and Benkoelen. Tuberculosis is noted as having given rise to increase as a cause of leave, particularly in the case of the native officials.

Mention is made of the activities of the hygiene and chemistry departments and of the research work done, and details are supplied of the Government Small-pox and Pasteur Institutes.

No important alterations were made in the quarantine and epidemic Ordinances. A new Ordinance for pilgrims was established, in which, among other matters, a better arrangement was reached for the protection of the pilgrims and in general of all interests concerned with the pilgrim traffic, on medical and sanitary grounds.

Information is given as to the school for the education of Indian doctors at Weltevreden, and at Soerabaja, and reports are included of the Hospital Department, Central Civil Hospitals, and the Department of Lunacy.

**NEW SOUTH WALES. Legislative Assembly. Report of the Director-General of Public Health for the Year 1923.** [ARMSTRONG (W. G.).] —pp. v+157. With 23 charts. 1924. Sydney: Alfred James Kent, Govt. Printer. [Price 7s. 3d.]

Amongst the numerous matters dealt with may be noted the first report on industrial hygiene, which consists of an investigation into the health and factory conditions of certain textile workers.

The textile mills were placed in two classes:—

Class 1. Mills not engaged in the manufacture of "tops" by the dry process.

Class 2. Mills engaged in the manufacture of "tops" by the dry process requiring a high relative humidity of from 50 to 70 per cent. and a fairly quiet atmosphere.

The general conclusions are as follows:—

Mills Class 1.

*Female Employees.* That the health of the female workers examined shows little deterioration that can be explained by the nature of their work. That seats with backs should be provided for all female workers.

*Male Employees.* That while the health of the male employees showed considerable divergence from the normal, and from what is thought to be the health of the male labouring community, the divergence cannot be shown to result from the nature of their work, except in certain minor affections.

*General.* That more satisfactory ventilation is required in the spinning and weaving sections.

Mills Class 2.

That the health of the female workers is affected by the conditions under which they work.

That the regulation of the temperature, humidity, and air movement in these mills is unsatisfactory and requires considerable improvement. Mills Classes 1 and 2.

That in the process of mixing wool or breaking up mill wastes or woollen or cotton materials either the product blown from the machines should be received in an enclosed space or an amount of oil sufficient to prevent dust should be added to the material treated. The amount of oil necessary might be the subject of a regulation. Mill hands should not work among the material blown from the machines until it has settled.

That machines called "Shakers" should be enclosed.

That the product of the deburring machine should be received in an enclosed space and not handled until it has settled.

That napping machines in which the material is treated dry should be enclosed.

That the machines called "Cutters" should be cleaned at least twice a day, or exhaust machinery fitted.

#### *Sanitation.*

All pan-closets should be made fly-proof.

Section IV contains the report of the Microbiological Laboratory. Amongst the items of interest may be mentioned :—

In the routine examination of rodents during 1923 no infected animals were found, although one case of human plague occurred in June. The number of rats caught and examined has decreased with the freedom of the city from plague; in 1920, 6,667 were examined; 1921, 16,633; 1922, 30,038; 1923, 19,176. The fleas collected were *Xenopsylla cheopis* (895); *Ctenopsylla musculi* (672); *Ceratophyllus fasciatus* (376); and *Ctenocephalus felis* (or *canis*) (11).

Three additional cases of anthrax from the use of shaving brushes occurred during 1923, bringing the total number to 28 cases. In 1920 14 cases were recorded and 11 more in 1922.

The Schick Reaction carried out in country schools as a mode of procedure for limiting the incidence of diphtheria gave the following results :—

	Percentage of positive reactions.			
Forbes State School ... ..	...	...	...	19.39
Forbes Convent School ... ..	...	...	...	23.25
Bedgerebong State School ... ..	...	...	...	24.1
Parkes State School ... ..	...	...	...	35.36
Parkes Convent School ... ..	...	...	...	12.5

A valuable contribution on the Australian ticks is included, keys for the identification of Australian species are given and many details as to the life-history and distribution of the different varieties in the country are provided. A list of the Australian ticks, their hosts and localization, and a useful bibliography on the subject is appended.

**SHANGHAI. Municipal Council. Public Health Department. Report of Commissioner of Public Health. 1924.** [DAVIS (C. Noel).]—56 pp. With 3 charts. 1925. Shanghai: Kelly and Walsh, Ltd.

The report contains the usual statistical tables and details affecting health.

As regards plague, the bubonic variety was reported in no fewer than 5 maritime countries having direct communication with Shanghai

during 1924. After three years of freedom from the disease, infection among both human beings and rats was discovered.

From November 9th to November 30th four human cases of bubonic plague and two plague-infected rats were found in the Central District and one plague-infected rat in the Eastern District. The usual experience in Shanghai, as elsewhere, is that an outbreak of human plague is preceded by an outbreak of rat-plague, and is often heralded by an unusual mortality amongst rats. But this is not always so, for sometimes human beings are attacked before the disease has made any visible strides among rats.

On the occurrence of the first human cases it was thought that, in the absence of plague-infected rats, possibly a plague-infected flea had been brought down in merchandise from Kiangsi and had transmitted the disease to man. The presence subsequently of plague infected rats makes it more probable, however, that the rat had the disease in the first place, as is usual.

The origin of the infected rodents is questionable; they may have been imported with merchandise or have escaped from a plague-infected region, or again, the disease in a mild form may be always present among the rats in Shanghai. This would not be detected till the disease became more prevalent and deaths occurred among the rats, for, in the absence of plague, trapped rats are not examined in the laboratory. In the Central District generally there is old and dilapidated property which is not rat-proof, and which is heavily infested with the rodents.

A flea census was taken of rats caught alive in the epidemic foci, which gave the following results:—

Ctenopsylla	...	...	49
Ceratophyllus	...	...	20
Xenopsylla	...	...	14

A census of rats of the first 1,000 taken resulted in 701 *Rattus rattus* to 229 *Rattus norvegicus*, the former being 70 per cent. of the total.

In a publicity campaign the cinematograph film has many and valuable uses, and this means is made use of in Shanghai. Among other matters dealt with by means of films the following are noted: "Natural Ice" shows the filthy surroundings on the borders of the Settlement amid which native ice is produced. Such polluted sources of supply must lead to serious intestinal disease. "Mosquito Extermination" illustrates the life-history of the mosquito, the methods by which breeding may be prevented, and an anti-mosquito brigade at work. The destruction of larvae by means of the small Paradise fish (*Polyacanthus opercularis*) and *Gambusia affinis* is also shown. There is a "Water Melon" film showing the dangers associated with this very popular refreshment, and "Our Drinking Water" demonstrates the importance of the domestic filter and the proper methods of cleansing. Managers of local cinema halls kindly permit the showing of the films on their screens.

**KING INSTITUTE OF PREVENTIVE MEDICINE, GUINDY. Report for the Year 1923-24.** [CUNNINGHAM (J.).]—29 pp. With 3 charts. 1925. Madras: Govt. Press.

A brief summary of the progress of the Institute during the past five years is as follows:—

In spite of the necessary retrenchment and want of funds the King Institute has expanded beyond all recognition.

The vaccine lymph and the microbiological sections remain, but the old serum section has been merged in the microbiological section, and a new section, the Public Health Section, has been created.

The expansion of the work has called for a complete reorganization of the scientific staff. The Institute now employs 165 men, as compared with 117 in 1919. Extensions in buildings involves the purchase of extra land for grazing and for proper quarantine arrangements for calves, a new operating theatre for the vaccine section, with the necessary adjuncts and sheds for finished calves. The alterations in the main building of the Institute will increase the laboratory space from the present 7 to 14 laboratories. Additional storerooms and offices and houses for the whole staff with the necessary additions for lighting and sewerage are also contemplated.

The problem of the manufacture of a potent lymph, which was so serious in 1919 as to make the Government consider the possibility of having to erect a new Institute, has now been definitely and satisfactorily solved. In the microbiological section, large scale manufacture of bacterial vaccines on approved lines has been introduced, and the staff is now so organized and trained that an almost indefinite expansion can take place should another emergency such as the epidemic of influenza arise.

By the institution of permanent mobile investigation units, the Institute has led the way in India in extending scientific investigation and advice to the districts. The demand for the services of these units has always exceeded the supply, and they have been instrumental in saving many serious situations where epidemic disease threatened to get, or actually was, out of control.

The value of the Institute from the financial point of view has been conclusively demonstrated, and the Government now recognize that the Institute not only pays its way but brings in a substantial profit in addition.

**CEYLON. Report of the Principal Civil Medical Officer and Inspector-General of Hospitals for the Year 1923.** [RUTHERFORD (G. J.).] 40 pp. With 1 map.

A summary of the Ankylostomiasis Campaigns for 1923 is given; in addition to the representatives of the International Health Board five medical officers of the local staff were specially employed and a varying personnel of subordinate assistants. The extent of the operations was as follows:—

(1) Intensive village treatment campaigns were confined solely to the Western Province, being located in areas selected and sanitated by the Sanitary Commissioner six months previous to the commencement of treatment measures.

(2) The hospital-dispensary units visited all Government medical centres in Eastern and Central Provinces, and completed the visits in Northern and Uva Provinces. In addition, a number of major dispensaries in Western, North-Western, Northern and Southern Provinces received special assistance during the latter part of the year.

(3) A demonstration of the feasibility and the value of control of ankylostomiasis on estates was carried out in the North Matale group.

Dysentery was unusually prevalent during 1923, 1,649 cases having been reported as against 748 in the previous year. The disease was particularly in evidence in the Western and Southern Provinces,



In one of the smaller outbreaks the faulty method of disposal of infected stools and the prevalence of flies was considered to be the cause, but in other areas where the disease assumed epidemic proportions the incidence is attributed to heavy rains and repeated floods which polluted sources of drinking water.

Enteric fever was also more prevalent than usual, and the same causes are considered to have been operative.

Other communicable diseases call for no special notice.

As in other countries "Curdled" or "Soured" milk is used by a large number of inhabitants in Ceylon. The usual method of preparation is to add a small portion of curd obtained from the local dairyman to a quantity of cool but previously boiled milk. The preparation is then left undisturbed for 18 to 24 hours at the end of which the milk is curdled and ready for consumption. A small portion of the freshly prepared curd is retained to start the batch of "soured" milk for the following day.

Eleven samples of curd procured from different sources were examined and were found to vary very considerably both as regards their physical properties and bacterial content. Four of the samples developed a foul odour characteristic of putrefaction within a few hours; they contained from 3,870 to 3,560,000 micro-organisms per cc. Streptococci were recovered from five of the samples and the faecal group of organism was present in many of the samples examined. A bacillus of the proteus group was present in two cases, *B. mesentericus* (*fuscus* or *vulgatus*) in three samples and *B. pyocyaneus*, an occasional cause of choleraic dysentery in Ceylon, in one. Nine samples contained a saccharomyces. Only 3 out of the 11 samples examined could be considered as of good quality from a bacteriological point of view, 5 were not fit for human consumption, and the remaining 3 were not above suspicion. Judging from the samples examined, it is possible that the indiscriminate use of these so-called soured milks may be the cause of obscure intestinal trouble in infants and adults in Ceylon.

**KHARTOUM, KHARTOUM-NORTH & OMDURMAN. Report on the Health and Sanitation, for the Twelve Months ending September 30th, 1924.** [BOUSFIELD (L.), M.O.H., Khartoum, & Chief San. Officer Sudan Govt.]—27 pp. With 1 chart.

Amongst the matters brought to notice is the question of the conservancy system. The double bucket system with lids is still in existence, and has now reached such a size as to be too big to be managed efficiently with the type of labour obtainable. Further, the whole system depends on a large supply of manual labour, and there is no "sweeper" class in the Sudan.

Expert advice is essential before any water-carriage system of sewerage is introduced, as the difficulties to be overcome are considerable. The country is very flat, and will not permit of a fall by gravity, the levels of the high and low Nile vary enormously, and with a really high Nile much of Khartoum would be under water were not steps taken to keep the river out.

During the year 161 new latrines were built, and between 10,000 and 11,000 buckets have to be handled daily in the three towns. The sewage pit areas continue to be satisfactory, and the sale of the soil for agricultural purposes continues popular.

Seven cases of tetanus were notified during the year, four being due to septic wounds and three, so far as could be ascertained, to intramuscular injections of quinine for malaria. The usual antiseptic precautions were taken in giving the injections, each of which were administered by a different person. Examination of the quinine material used for inoculation was negative for the presence of the tetanus bacillus.

A statement is given showing the changes in the general condition and sanitary state of the three towns during the period 1913-1924.

**KENYA, Colony and Protectorate of: Annual Medical Report for the Year ending 31st December, 1923** [GILKS (J. L.) P.M.O.] including the **Annual Report of the Bacteriological Laboratory for the Year 1923** [KAUNTZE (W. H.), Senior Bacteriologist.]—pp. iii+126. Nairobi: The Swift Press, Ltd.

Section III deals with the major endemic and epidemic diseases. The experience of 1923 does not show that Yaws is present to any great extent in districts other than those set forth in the previous annual report. The number of cases treated, 64,344, was largely in excess of that treated in the previous year. There has been no reason to modify the good opinion already expressed with regard to the efficacy of bismutho-tartrate of sodium and potassium; medical officers without exception have expressed themselves as satisfied with the results obtained. The most common toxic effect noted was stomatitis, but since the standard dose for adults of 3 grains (0.2 gramme) was universally adopted these effects have not been unduly prominent.

A very considerable increase in Syphilis was noted; this may be accounted for partly by the increased travelling by medical officers in the Native Reserves and to an increasing faith in the treatment afforded. Novarsenobillon is used only for cases presenting special features, the standard treatment consisting of intramuscular injections of bismutho-tartrate of sodium and potassium.

A large increase of the number of cases of Leprosy applying for treatment occurred, but there is no reason to believe that there has been any increase in the incidence of the disease, the correct explanation being that a more accurate knowledge is being obtained as to the conditions that exist in the Reserves.

It is believed that Tuberculosis is common even in the Native Reserves, but most of the cases escape notification. With further opportunity for more thorough clinical and bacteriological examination it is feared that the disease will be found to be common and widespread. Pulmonary tuberculosis in the native appears to be very rapidly fatal; cases of surgical tuberculosis are by no means uncommon.

Plague was prevalent in various localities and was noted in Nyanza, Ukamba, Kikuyu, Naivasha and Seyidie Provinces. In some places it assumed epidemic proportions. As regards rats, it is mentioned that the northern limit of the distribution of *Rattus rattus kijabius* as demarcated in 1921 by the late Mr. N. VAN SOMEREN has now undergone extension. In contrast to South Africa, it is interesting to note that plague, so far as is known, occurs in Kenya only in those areas where, generally speaking, the conditions of soil and climate are unsuitable to gerbilles and that with one exception the areas from

which gerbilles have been reported are free from plague. Research is urgently required, for the number of undetermined factors in Kenya is too great to allow of effective preventive work.

With the exception of a few cases, Small-pox was absent. 56,345 vaccinations were performed; the lymph produced in the Laboratory at Nairobi proved, as usual, to be exceedingly satisfactory.

Pneumonia must be considered one of the most important factors in the death rate of Kenya. In Nairobi, out of a total of 405 deaths 163 were due to this disease. It is pointed out that pneumonia among the well-fed and well-clothed askari of the King's African Rifles is a much less fatal disease than in the frequently underfed natives from the Reserve or town.

Thirteen cases of Undulant Fever were reported during the year.

The incidence of Malaria was about the normal, 18,330 cases with 37 deaths being recorded. Blackwater Fever shows a total of 27 cases with 6 deaths.

The hospital returns show a large increase in the number of cases of Trypanosomiasis under treatment during the year; there is no suspicion, however, that the incidence of the disease has increased to any extent. A special investigation in the sleeping sickness area of Central and South Kavirondo was carried out by Dr. Lyndhurst DUKE an account of which is given in Appendix "C."

Relapsing Fever gave rise to 65 cases, a slight increase over the previous year.

Nothing has come to light to modify the conclusion that the great majority of the native population suffers from one or more helminthic infections, and though usually no symptoms are produced, it is probable that a loss of resistance to other and especially intestinal diseases is the result.

The annual report of the Bacteriological laboratory is printed in the main Report, and contains an account of the reorganization of the laboratory services, details of routine work, and the report of the research division. In Appendix II is detailed the schedule of subjects required of African laboratory assistants in training and the scales of pay for the various grades.

**TANGANYIKA TERRITORY. Annual Medical Report for the Year ending Dec. 31st, 1923.** [DAVEY (J. B.), P.M.O.]—207 pp. With 3 charts & 1 map.

On the subject of General Diseases: Anaemia, from whatsoever cause arising (ankylostomiasis, schistosomiasis or trypanosomiasis), is of common occurrence among the natives. Arthritis is frequently observed, but in many cases its nature is obscure. Pyorrhoea and other sources of septic infection are very common. Food deficiency diseases do not figure prominently in the returns. Gross organic lesions of the nervous system are seldom reported among natives but epilepsy is common and frequently severe. Diseases of the eye, principally conjunctivitis, are common, and cases of blindness, due commonly to small-pox, cataract, or injury, are numerous. Diseases of the ear are very common and discharging ear cases in native children are a troublesome problem in dispensary practice. Pneumonia causes a heavy mortality among natives, and bronchitis, not usually of severe degree, is very common. Diseases of the digestive organs are frequent, and the suspicion that, of the numerous cases of stomatitis in natives,

many are mild forms of scurvy can hardly be rejected ; dental caries is far more common among natives than is usually believed. Abscess is extremely common and the aetiology of many of the large abscesses is often obscure ; some no doubt are tubercular, possibly some are filarial. Diseases of the skin are almost universal, scabies frequently masked by severe impetigo is exceedingly common, and ulcers are a great cause of disablement. The tumours met with are commonly fibromata or lipomata, and are often of enormous size before skilled attention is sought.

Of the helminthic diseases, it is probable that schistosomiasis is widespread in the Territory, though it has been reported from only a few stations ; taenia is a very common parasite due, in the large majority of cases, to the consumption of measly beef ; ankylostomiasis is common in the coastal area, particularly in the neighbourhood of Tanga ; filariasis is widely distributed ; ascariasis is very prevalent ; no case of guinea worm has been reported during the past three years ; *trichocephalus dispar* is common. Cutaneous myiasis is not uncommon in Europeans, and though cases are not often seen in natives they must, no doubt, often occur. Chiggers are widely distributed. Cerebro-spinal meningitis was prevalent since the first week of the year in Mwanza district, whence 90 out of the 101 cases were reported. Nine cases of dengue were reported from Dar-es-Salaam. Dysentery, usually of a mild type, is distributed throughout the Territory ; the enteric fevers occur sporadically ; " Seven-day Fever " of non-malarial origin, in limited amount, and of negative blood culture, was reported from Dar-es-Salaam. Leishmaniasis does not exist, so far as is known, in the Territory, but the occurrence of undoubted cases of kala azar in Kenya demands watchfulness.

Malaria is general throughout the Territory ; even the healthiest stations have malarious country round them, and infection is easily acquired when on tour ; 19 Europeans and 16 non-Europeans were treated for blackwater fever during the year, but no cases were recorded amongst natives. Plague occurred in the endemic areas of Singida and Shirati, a total of 39 cases with 26 deaths being reported during the year. Relapsing fever gave rise to 119 notifications ; *Ornithodoros moubata* is widely distributed, and during the war established itself in several European residences ; the danger of acquiring infection appears to vary greatly in different districts. Smallpox diminished continuously throughout the Territory during the year ; nearly half the cases occurred in the Tanga district. Trypanosomiasis undoubtedly occurs in parts of the Territory other than the Mwanza district, and it was intended to investigate the question as soon as staff was available. The observations made in 1923 confirm the opinion expressed in the Annual Report of 1922 that the vector is *G. swynnertoni*, and the causal trypanosome *T. rhodesiense*. Yaws is probably the most important cause of disability and ill-health amongst the natives ; in some districts it is described as being practically universal.

The Report contains detailed accounts of certain of the diseases above mentioned. In the annual report of the medical officer of the Anglo-Belgian Boundary Commission interesting information is supplied on many matters, including the general physique and some customs and habits of the natives in the districts which were traversed, and a section dealing with the entomology of the area.

In Section VI, Scientific, is to be found the third report upon treatment with bismuth sodium and potassium tartrate, which preparation

has a very decided curative effect on cases of yaws and primary and secondary syphilis. In tick fever the few results reported were disappointing.

The report of the Dar-es-Salaam laboratory is also included, and contains much interesting matter.

The usual statistical tables are appended.

BALFOUR (Andrew), [C.B., C.M.G., M.D., B.Sc., F.R.C.P.E., D.P.H., Director, London School of Hygiene & Tropical Medicine.].  
**Report on Medical and Sanitary Matters in Bermuda, 1923.**—91 pp.  
 With 1 chart, 1 folding map, 1 folding plan & 107 figs. on 36 plates.  
 1925. London: Waterlow & Sons, Ltd., London Wall.

This investigation was carried out in 1923 at the request of the Secretary of State for the Colonies. The original terms of reference were "to report and advise on the best means for the reduction of mosquitoes and to enquire into the rôle that mosquitoes may play in the propagation of disease, and more especially the febrile diseases occurring in the Colony." These terms were subsequently amended "to include the consideration of all those conditions of the public health which may detrimentally affect the tourist traffic to the Colony and its popularity as a place of resort for visitors from Europe and the United States of America."

Before leaving the Colony an interim report was submitted so that action could be taken on several matters requiring immediate attention. It dealt with the following subjects: The mosquito problem; laboratory provision; communicable diseases and their prevention; the leprosy question; King Edward VII Memorial Hospital; school hygiene; the poor houses; general sanitary condition of the Colony; co-ordination of medical and sanitary work; health administration.

The Report is an example of what may be accomplished in a strictly limited period of time, and should prove a useful guide to others called upon to conduct enquiries of a similar nature. It contains a mass of detailed information as to the local conditions, pointing out the defects noted and suggesting means by which they may be remedied. Much of the subject matter is naturally of local interest, as it is descriptive of the conditions appertaining to the island, yet it may prove of interest to those living in other islands situated in comparable position in certain respects to Bermuda, and may prompt enquiry of a local character in the problems that may exist there.

The mosquito problem, for instance, is one which is without much doubt of interest elsewhere than Bermuda. The four species of mosquito found are *Aedes aegypti* (*A. argenteus*, *Stegomyia fasciata*), *Culex fatigans*, *Aedes sollicitans* and *Aedes taeniorhynchus*. The two last-named are salt-marsh breeding mosquitoes, and while not known to be carriers of any disease, may make life a burden, as they are very vicious biters. Contrary to its habits in the U.S.A., *Aedes sollicitans* in Bermuda does not appear to range far from its breeding-places, and does not tend to enter houses. In the summer *Aedes taeniorhynchus* disperses itself widely and frequently invades habitations.

*Aedes aegypti* in Bermuda appears to be wholly a domestic breeding mosquito; no evidence could be found of its larvae in hollow trees, cavities in cut bamboos, etc., at any rate during the winter months,

at which time the investigations on which the report is based were conducted. It is, however, probable that such places are utilized in the summer season, for it was found to be breeding in rowing boats beached for the winter, water-containing barrels which had been used for mixing lime, the shallow layer of water which accumulates on the top of a barrel standing on end, and in flower receptacles in cemeteries, during the winter months.

In some respects *Culex fatigans* is the most important mosquito in Bermuda, for it is present in large numbers in the neighbourhood of houses, and is quite possibly the carrier of dengue fever, which still occurs at intervals in the Colony.

No likelihood of the total extermination of all four species of mosquito is probable, but it should not be impossible to get rid wholly of the two salt-marsh breeders, while *Aedes aegypti* might be reduced to vanishing point. *C. fatigans* is a more difficult problem, but in a comparatively small area like Bermuda there is hope that concerted action on well-conceived lines would bring it close to extinction and keep the numbers at a low level.

In detailing the measures for combating the mosquito nuisance one most important point may here be mentioned; namely, that the services of an expert entomologist would be of the very greatest value in advising on the necessary engineering work in filling operations, etc. Such advice may well repay any cost of provision, for, unless the bionomics of the particular mosquito attacked are fully understood, much unnecessary work may be undertaken and expense incurred. This is true not only with reference to mosquitoes, but in practically every measure affecting the control of animal life with which the sanitarian has to deal.

It is not possible to give particulars of the many other matters dealt with in this report, and those interested are recommended to read it in the original.

HILL (Rolla B.). **Public Health Progress in Porto Rico.**—*Amer. Jl. Trop. Med.* 1925. May. Vol. 5. No. 3. pp. 211-217.

Public health work in Porto Rico may be said to have begun in 1918 with the initiation of a campaign against the hookworm under the leadership of the International Health Board of the Rockefeller Foundation. A survey showed that 90 per cent. of the rural population of the island were suffering from the disease. There was, however, a lack of public interest at first, but the work was again taken up in 1920 and pursued with activity.

Less than 10 per cent. of the homes visited were then found to possess latrines, but in three and a half years no less than 35,000 latrines have been built in the zones of intensive operations, and now it is a common matter to find fully 25 per cent. or more of the houses provided with them. Many thousands have also been built outside these zones of special activity.

In 1920 malaria studies were undertaken in the irrigated section of the southern part of the island, and in 1924 these were extended to the northern portion. Reliance is placed on quinization in the endemic regions, while several drainage operations have been effected and fish are coming into use to control mosquito breeding.

A special plague preventive service has been organized, and a modern plague laboratory is in existence. In 1923, 115,000 rats were destroyed. Warehouses are periodically fumigated.

There has been an alarming increase of tuberculosis, especially in the larger cities, and in 1923 a Bureau of Tuberculosis was organized. An active campaign was at once begun; dispensaries were opened in the principal towns, visiting nurses were sent out to find and to follow up cases, and much propaganda work was undertaken.

In 1923, also, a Bureau of Venereal Diseases was formed, which by means of dispensaries, publicity and educational work, is engaging actively with the disease.

In the same year a Bureau of Child Hygiene and Social Welfare was instituted, vaccination against smallpox has been made compulsory, the Schick test has been introduced and toxin-antitoxin immunization is practised in certain places. Regular medical and dental examinations are made of all school children, both urban and rural, the parents being notified of any defects encountered.

The Department of Health employs eight full-time medical officers and a large number of inspectors. There is a main public health laboratory and a special division of sanitary engineering.

The newly-organized School of Tropical Medicine, under the auspices of the Columbia University, commenced its first session in November, 1924.

Porto Rico has made enormous forward strides and has found the resulting advantages well worth attainment.

**UNITED FRUIT COMPANY. Medical Department. Thirteenth Annual Report.** [DEEKS (William E.), General Manager.]—247 pp. With 1 map & 9 figs. Boston, Massachusetts: General Offices.

This report contains much of interest. In Section III, amongst the matters dealt with in the "Comments on some of the chief Tropical Diseases and their Treatment," the following may be noted.

The conclusions reached as regards Malaria may thus be briefly summarized:—

(1) The administration of quinine will not prevent malaria infection. In other words, quinine has no effect on the sporozoites, but becomes effective only after the malarial parasites have entered the red blood cells.

(2) The daily administration of quinine, or its interrupted administration two or three times weekly in sufficient quantities, though not preventing malaria infection, will control its development and probably cure many of the cases in from 10 to 14 days, if reinfection is prevented. As reported by some of the medical superintendents, the continuous use of quinine prophylactically is serving a very useful purpose in greatly reducing the morbidity and consequently the number of hospital admissions.

(3) Cases of malaria complicated with other conditions are more difficult to cure than uncomplicated cases.

(4) The more chronic the infection, the longer the administration of quinine must be continued in order to effect a cure.

(5) Immunity can be, and frequently is, developed, but immunity against one species of the malarial mosquito does not prevent infection by other species.

(6) Proper and sufficient nourishment plays an important rôle in the development of immunity.

(7) The therapeutic results of quinine given in liquid and solid form are the same, provided the drug in either case is swallowed, retained and absorbed. Some, however, believe that the liquid preparations act more quickly than the solid.

(8) It is important to know that all solid preparations of quinine must disintegrate rapidly, or they will pass through the alimentary tract unchanged.

(9) There is no reason why an intelligent man, with a proper knowledge of the causation and prevention of malaria, should contract the disease if he has measures available for his protection, and applies them.

The routine method of treatment in all the hospitals of the United Fruit Company has hitherto been 15 grains of quinine in solution three times daily, but during the last year alteration in this routine was instituted by Dr. MACPHAIL. He at first substituted 20 grains of liquid quinine morning and evening. The control of symptoms was affected as quickly and efficiently as in the case of those given 15 grains three times a day, the economy in the nurses' time is considerable, and the patients prefer taking the bitter mixture twice a day to taking it three times; in fact, the results obtained were satisfactory from all points of view. A further change was then tried and quinine, mostly in friable tablets, was given in the dry condition in doses of 20 grains morning and evening. The charts of 1,024 cases thus treated were analysed with a view to comparison with the older routine method of giving quinine in solution. Of these 1,024 cases only 29, that is, less than 4 per cent., showed secondary rises of temperature, or persistent temperature, demonstrating lack of control. All the series were uncomplicated malaria; 406 were aestivo-autumnal infections, 357 tertian, 5 quartan, 22 mixed infections, and 234 were clinical cases. From these findings it was concluded that, from the purely therapeutic point, the present routine of 20 grains of dry quinine twice daily compares favourably with any method previously followed. When the economy effected in the nurses' time, and the ease with which the average patient takes the drug in the dry state is considered, there is a strong argument for the use of dry quinine. The essential point of the greatest importance in obtaining satisfactory results is that the tablets administered should be really friable.

As regards blackwater fever the results obtained in treatment in the Banes, Costa Rica and Quirigua Divisions have been exceedingly satisfactory. The use of anti-streptococcic serum was tried, as also was caffeine sodio-benzoate; in both cases the beneficial action of the drugs is held to be due to the anti-haemolytic properties which they possess. It was noted, as has been done on many other occasions, that after the administration of quinine in 10 grain doses three times daily was begun there was a return of the blackwater. Following an attack of blackwater fever, after the urine is cleared and the administration of quinine is indicated, it is wise to begin with a very small dose—from 2 to 5 grains—and if within a few hours there is no recurrence of the symptoms, the dose may be gradually increased.

As regards typhoid fever there has been some doubt in the mind of certain local physicians whether these diseases existed in the Colombian Division or not. This doubt, however, has been dispelled



by the positive Widal tests, and the blood cultures made from cases coming into hospital from these regions.

As to the incidence of pneumonia among the labourers in banana plantations, Dr. WINN, of Puerto Castilla, makes the following statement :—

At least four factors have to be taken into consideration as affecting the incidence of the disease :—

(1) The first and foremost is held to be lack of personal hygiene and cleanliness. The labourers work on the banana farms, they rarely bathe and rarely change their clothes. They come in wet at night from perspiration, and lie down to sleep in the same wet clothing.

(2) Many of them suffer from debilitating diseases, like malaria, hookworm, syphilis, etc.

(3) A large number of them are alcoholics and suffer from some form of nephritis. Undoubtedly, also, the question of bad teeth, pyorrhoea, infections, etc., has some influence on the incidence of pneumonia.

(4) Undernourishment and lack of proper food doubtless play a part in lowering the vitality and therefore the resistance to disease.

WOLFF (J. W.). **Some Statistics about Surinam (Dutch Guyana).**—

Reprinted from *Metron*. 1924. Dec. 1. Vol. 4. No. 2. 7 pp.

With 2 text figs.

Surinam, or Dutch Guiana, covers an area four times as large as Holland. The greater part of the country is dense tropical forest, here and there intersected by large streams which form the natural means of communication through the interior. The country is extremely sparsely inhabited and great parts of the interior are still unknown. Besides the capital, Paramaribo, there are only three or four villages on the strip of country along the coast. In the interior some of the original Red Indian inhabitants are left and there are some settlements of bush negroes. Camps of creole or negro labourers engaged in gold digging, balata bleeding (a kind of indiarubber) or prospecting may be met with.

The population represents an amalgamation of many races, due to immigration of foreigners since the discovery of the fertility of the land. Prior to 1921 no accurate census was available; the figures for that year, exclusive of Red Indians and bush negroes, made a total of 107,723; 56,177 being men and 51,546 being women. East Indians and Javanese form an important part of the population, Europeans being sparsely represented.

Of diseases, malaria, especially the malignant type, is of greatest import, but typhoid fever, dysentery, filariasis, leprosy and ankylostomiasis are present.

BULLETIN OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. 1925.

June. Vol. 17. No. 6. pp. 633-640. [4 refs.]—**Activité du gouvernement péruvien, dans le domaine sanitaire, pendant le second semestre de l'année 1922 et toute l'année 1923. (Extrait du Boletín de la Dirección de Salubridad Pública, Ministerio de Fomento de la República del Perú, Lima, 1924.)**

The more important measures include the reorganization and the extension of the sanitary services of the Republic, new regulations governing the practice of medicine, obstetrics, pharmacy and dentistry,

measures for the protection of mothers and infants, works for the improvement of conditions in town and country, campaigns against bubonic plague, tuberculosis, malaria, etc., disposition and regulations as to mortuaries and cemeteries.

Details are given of the various changes under the above headings and a list of the principal legislative measures is attached. The improvements are in accordance with the practice of modern medicine.

#### MISCELLANEOUS.

BALFOUR (Andrew). **The Teaching of Preventive Medicine.**—*Public Health*. 1925. Feb. Vol. 38. No. 5. pp. 135-141.

After some preliminary remarks upon the importance of that sanitary environment which the present age, in its anxiety for the hygiene of the individual, almost takes for granted, and upon the scope of that environment, and, furthermore, upon the importance of a knowledge of the history of the growth of that environment [all points of fundamental interest to the whole medical profession], the author goes on to outline and expound the provisional scheme of instruction to be followed in the Hygiene branch of the London School of Hygiene and Tropical Medicine. The scheme, which will provide for the separate requirements (a) of candidates for the D.P.H., and (b) of advanced students and others following special professional lines of study, includes six distinct fields of work, namely: (1) Applied physics, physiology, and the principles of hygiene; (2) chemistry and biochemistry; (3) immunology and bacteriology; (4) medical zoology, parasitology, and comparative pathology; (5) epidemiology and statistics; and (6) the principles and practice of preventive medicine, general sanitation, and administration. For the further subdivision of these six sections and the ordered "courses" to which they severally contribute the original article can be consulted.

A. Alcock.

BALFOUR (Andrew). **The Trend of Modern Hygiene.**—*Jl. Roy. Soc. of Arts*. 1925. May 29. Vol. 73. pp. 623-639.

The subject was dealt with in a lecture at the Royal Society of Arts. The lecturer first traced the ancient sanitary principles, leading thus to the modern ideas of hygiene. Stress was laid upon the need for education, not so particularly of the medical fraternity and its associated workers, as of the general public. Unless the "man in the street" is alive to the needs of sanitation advance is delayed, for it is public opinion which is the great driving force in health matters as in most things.

In this country the importance of veterinary science in its relation to the public health is not yet fully realized. Enlightenment on this matter is commencing and interest is being awakened. Publicity is needed and the Press can do much to help matters forward if it be rightly guided.

The penetration of health considerations into the ordinary life of the citizen is evidenced by the attention paid to the subject by

insurance companies, especially in the United States. The application of modern health principles has been found to be a sound business proposition for the insurance profession and, moreover, it is of profit to the insured person.

As regards the medical profession itself the tendency is undoubtedly towards the gradual implantation on the mind of the general practitioner of the greater value of disease prevention as compared with the cure of existing ailments. In America this "permeation of the medical curriculum with the preventive idea" is further advanced than it is with us, for in the Vanderbilt University, Nashville, Tennessee, appointment has recently been made to a chair which will be concerned with this work.

On the question of food much still remains to be done, and we are not in the fore in the world in these matters. We are beginning to realize that we are a dirty nation in many matters concerned with the handling of food.

Mention was made of the world-wide activities of the International Health Board of the Rockefeller Foundation, which has spread its campaigns all over the globe and whose operations are as diverse as they are valuable.

The question of the over population of the world following on man's interference with Nature's principle of the survival of the fittest is touched upon. We cannot pierce the future, and, anyhow, this old world of ours has a way of settling its own problems irrespective of puny man. If the work of the hygienist as applied to the saving of life is wrong in principle we may be sure that in due time the corrective will be applied. At least for the present it is our duty to carry on in the manner which we, as a result of the knowledge we have acquired, believe to be right.

**LEISHMAN (William). Health in the Tropics : the Present and the Future. Being the Linacre Lecture, 1925, St. John's College, Cambridge.—Jl. Roy. Army Med. Corps. 1925. Aug. Vol. 45. No. 2. pp. 81-95.**

The lecturer chose this subject for his discourse for two reasons: First, because of his strong belief in its importance, and secondly, because of the urgent need that there should be a wider appreciation of our responsibilities in this matter, both present and to come.

As examples of the above, twelve from the long list of tropical diseases were selected because: (a) of the degree and importance of their influence upon the health of either the white or the native population, or both; (b) of the stage of our knowledge as to their causation and of the means of prevention; and (c) of the different degree in which it has been found practicable to apply existing knowledge to their effective control.

The diseases selected for examination were ankylostomiasis, cholera, dysentery, enteric fever, filariasis, leprosy, malaria, plague, relapsing fevers, sleeping sickness, typhus fever and yellow fever. Each disease was shortly described, and its influence on the peoples of the world and its effects upon progress were mentioned. The position of our present-day knowledge as to their causation and the means we possess for prevention were shortly described.

The lecturer expressed the opinion that, on the whole, we are too much inclined to congratulate ourselves on the remarkable progress

that has been made in tropical medicine during the last 30 years, and to lay stress on what has been done rather than upon what remains to be done. Again, it is not sufficiently realized that most of us, when we speak or read of health in the tropics, think almost entirely of the white residents, and give little thought to that of the native populations.

As regards the white resident in the tropics, accurate knowledge of the causation of disease, the diffusion of that knowledge and its utilization by an efficient health service, have, in his case, made life in the tropics, at any rate in most places, almost as safe as at home.

On the other hand, what is the condition of the 300,000,000 of the native races for whom we are responsible? Their state may be gauged by anyone who is interested by reference to official reports and blue books, a perusal of which can only cause us grave heart-searching and disquietude. In short, the native, from the health point of view, is, in many countries, little, if at all, better off than he was before we accumulated the mass of knowledge from which the white has benefited and is benefiting so greatly.

Sympathy and understanding are most certainly not wanting amongst most of the responsible officials, and the whole-hearted devotion of those engaged in health work in the tropics can only call forth true admiration. Yet for progress to be made we do lack certain things, and these are three in number—men, money, and knowledge.

**Lack of men.** Only those familiar with the existing conditions can realize the pitiful inadequacy of the numbers engaged in the fight against disease in the tropics. What can one expect where perhaps a single white man is responsible for the health of a population of hundreds of thousands spread over an area many parts of which he can only hope to visit once or twice in the year? Where we have one man now, in many parts of our tropical possessions we ought to have ten and in some places, indeed, fifty would not be too many. This lack of men includes all personnel, from the Director of Medical Services to the trained native assistants of the sanitary inspectors. One class especially needs reinforcement, the European Sanitary Inspector, whose power for good, given the right man, is infinite. Reinforcements of personnel are inseparably connected with money.

**Lack of money.** This handicaps, with exceptional severity, progress in the tropics. The financial mind is most readily appealed to by a satisfactory rate of interest on the money expended, and is not so likely to respond to an account of fewer deaths of adults and an improved infantile mortality. This is, however, not always the case; here and there local governments, individual undertakings and business concerns have shown a wide and generous sympathy in the matter. In many cases this expenditure on health measures has been amply justified even from the money point of view. If those who provide the funds can be convinced, not only that the measures are necessary, but that they are thoroughly sound in principle, can be applied effectively and have been framed with due regard to economy, it is probable that steady advance in this respect is to be anticipated.

**Lack of knowledge.** In spite of all we have so far gained, there is need of more information on many points. One direction in which knowledge is most necessary is the economical application of preventive measures. Our present knowledge often points to measures which are altogether impracticable to a populace of a low scale as regards

civilization, or which are and must remain entirely out of the question on account of their prohibitive cost.

There is need to foster our dissatisfaction at the limitations of our knowledge, and there is a crying need for more and more research. The lines of approach are innumerable, and each disease has its own unsolved problems, many of which in the tropics are concerned with insect hosts or transmitters. One must get far closer down to the intimate life of these dangerous pests and learn ever, in more and more detail, their hopes and fears, their tastes and dislikes, their loves and hates, and so wrest from them such secrets as we may hope to utilize.

MAITRA (Jogendra Nath). **Medical Examination of the Students of the Presidency College, 1924.**—*Calcutta Med. Jl.* 1925. Apr. Vol. 20. No. 10. pp. 382-385.

Five hundred and sixty-five students of the 1st and 2nd year classes in the Intermediate Arts and Science and B.A. and B.Sc. courses were examined with the following results :—

As regards general appearance, A denotes good muscular development ; B, stoutness without muscularity ; C, medium musculature ; and D, poor bodily development.

A.	B.	C.	D.
5.84 per cent.	10.61 per cent.	64.24 per cent.	18.93 per cent.

As regards posture, the students were divided into Erect and Stooping :—

Erect.	Stooping.
63.18 per cent.	36.82 per cent.

As regards vision, the following was found :—

Normal.	Defective.
61.04 per cent.	38.96 per cent.

As regards teeth and gums :—

Teeth.		Gums.	
	per cent.		per cent.
Normal	75.57	Normal	73.99
Carious	8.84	Spongy	24.07
Defective	15.59	Pyorrhoea	1.94

Defective teeth was believed to be correlated with poor physical development.

Fifty-nine per cent. were found to be defective owing to affections of heart, throat, lungs, spleen, eyes, liver, etc.

FREDERICK (Robert C.). **The Investigation of Ventilation Conditions.**—Reprinted from *The Analyst*. 1925. May. pp. 213-223. [29 refs.]

The harmful effects of living in air vitiated by the products of respiration were formerly considered to be due to the poisonous action of the added carbon dioxide, the deficiency of oxygen, and the presence of an unidentified poison.

DE CHAUMONT, in 1875, stated that when the normal amount of carbon dioxide in fresh air, which he considered to be 0.04 per cent., was increased by more than 0.02 per cent. from respiration this excess was perceptible to the senses by an associated disagreeable smell. It is remarkable how this statement received, and still receives, such general acceptance. The error was perpetuated in the fixation of the so-called sanitary limit for carbon dioxide, 0.04+0.02, a total of 0.06

per cent., which to this day appears to be regarded as standard by many analysts and sanitarians. The question of the effect of carbon dioxide may be disposed of, for a concentration of 0.5 per cent. leads to no noticeable increase in the ventilation of the lungs; a concentration of 2.0 per cent. simply results in a 50 per cent. increase in the depth of breathing such as occurs with moderate exercise, and living in such a concentration does not cause discomfort unless vigorous exercise is performed. It is not until the amount increases to between 5 and 7 per cent. that breathing becomes laboured when the subject is at rest.

The claim that deficiency of oxygen was responsible is also incorrect, for Leonard HILL has shown that a person not exerting himself will fail to notice any effect until the oxygen has been reduced to about 11 per cent., and consciousness will not be lost until the percentage sinks as low as below 7 per cent.

The belief in the existence of a poison in exhaled air was founded on experiments in which the condensed water vapour from human expirations was injected into animals with fatal results. The question has since been the subject of much research, and the net result goes to show that there is no evidence that such a poison exists.

HERMANS was the first to state definitely that the most important considerations in ventilation are not carbon dioxide, or oxygen, or personal effluvia, but temperature and humidity. His teaching fell, for the most part, on deaf ears, and it was not until 1905 that his theories obtained general acceptance.

The importance of temperature and humidity is due to their influence on the body metabolism. The body is continually forming heat, and to maintain a proper balance there must be a continuous process of heat loss of adequate compensatory degree. When temperature and humidity are high, heat loss is retarded, and discomfort is experienced; in extreme cases heat-stroke and death may supervene. The essential requirement of ventilation is, therefore, that conditions shall be maintained such as to permit free loss of heat from the individual.

The heat-regulating mechanism is greatly assisted by any means which disperse the envelope of hot humid air surrounding the subject between the skin and the clothes. Movement of air in a space by direct transfer and promotion of evaporation is the most potent factor in rendering this assistance, and its importance in ventilation cannot be over emphasized.

In investigating ventilation conditions it is necessary to make the following examinations of the air: (1) Determination of carbon dioxide; (2) determination of temperature and humidity; and (3) determination of cooling power. Of these, the first is the most important, for, if the figure is low, it is probable, speaking generally, that the remaining determinations will also give satisfactory results.

The methods recommended are: For determination of carbon dioxide, the Haldane Apparatus; for determination of temperature and humidity, a wet and dry bulb hygrometer of the Mason type; for determination of the cooling power, the Kata-thermometer, the dry instrument giving the cooling power by radiation and convection, and the wet that by radiation, convection and evaporation, and in consequence the difference between the two is the cooling power by evaporation. Details of the working of the apparatus mentioned are supplied. Air movement can be most conveniently studied by observing the behaviour of a column of smoke.

**HEALTH. Skin Eruption due to Mites in Upholstery Work.—1925. May.**  
Vol. 3. No. 3. p. 86.

At a motor works in Brisbane a number of workmen developed skin eruptions, which were thought to be associated with the presence in the upholstery of the cars of a large number of mites. The cars had very recently been imported from Italy.

The eruption somewhat resembled that of scabies, and was not attended by any constitutional disturbance or by any absence from duty. It had thus none of the characteristics of the typhus-like disease described by HONE in Adelaide.

Specimens of the mites were examined, and the majority were found to be *Tyroglyphus* species. It is probable that the upholstery had become infested either in Italy or during passage in a mite-infested ship, the cars having only very recently arrived in Australia.

Instances have been previously reported in Australia by CLELAND and others of skin eruption due to the bites of mites.

**CAMPBELL (E. A. Glen). The Housing Problem of the Poor and Labouring Classes and the Slums of Kingston, Jamaica. Conditions existing locally, of which Majority of Citizens not aware. An Address delivered before the Liberal Association, January 11th, 1919.—19 pp. Kingston: Gleaner Co., Ltd.**

The author of the address is the Chief Sanitary Inspector of the Colony, whose work takes him into places not usually entered by the ordinary citizen. According to the account housing conditions in certain parts of the town are in a deplorable state of overcrowding and general insanitation. The position of the Municipality in reference to the existing state of affairs is discussed, as also is that of private enterprise, and the local condition is contrasted with other and more fortunate places. Suggestions are put forward whereby the present conditions may be remedied; these, as may be expected, involve considerable expenditure of money.

Addresses such as this are of value in that they ventilate a wrong, invite discussion, criticism and possibly opposition, and yet may awaken a sanitary conscience where it is apparently dormant.

**STEWART (A. D.) & BANERJEE (Nani Lal). On the Commercial Preparation of a Neutral Soft Soap.—Indian J. Med. Res. 1925. Apr. Vol. 12. No. 4. pp. 783-787.**

Soft soap has a variety of uses for medicinal and for textile purposes, and in both cases the presence of free alkali in it is objectionable, and unsaponified fat, oil or fatty acid is detrimental to the lathering power of the soap.

Olive, linseed or cotton-seed oils are all expensive, but the investigators found that fish oil is cheap in comparison, and is suitable for use. The only objection to this oil is its smell, but this can be largely eliminated by the suggested method of saponification, and any trace left can be totally masked by the addition of a small quantity of a cheap scent such as lemon-grass oil.

It was found that a reversal of the ordinary process of adding the lye to the hot oil was advantageous and soap thus prepared is much

more free from fishy odour than that prepared by adding the alkali to the oil. The odour can be further diminished by diluting the soap with water, prolonged boiling, and blowing air through the hot mass.  $\text{NH}_4\text{Cl}$  was found most suitable for neutralization, and the process needs to be carried to excess of the theoretical amount.

The conclusion is that a cheap and practically inodorous soft soap can be manufactured from fish oil by running the oil into an excess of hot KOH lye gradually and diluting, boiling the mixture and subsequently blowing air through it. The excess of alkali in the soap can be easily neutralized by adding a solution of  $\text{NH}_4\text{Cl}$  to 28 per cent. in excess of the theoretical amount required. Ammonium chloride has a three-fold advantage: (1) It offers a rapid method of estimating free alkali in the soap; (2) it can be recovered and used over and over again; (3) a portion of it can be left in the soap with advantage.

LEAGUE OF NATIONS: **Health Section, Eastern Bureau. The AA Cable Code. Compiled for the Bureau by Gilbert E. Brooke, Director.**—45 pp. With 1 plate & 1 folding map. 1925. Singapore: C. A. Ribeiro & Co., Ltd.

The Code will secure ease of communication for the specific purposes of the Bureau and a maximum condensation of material in a minimum of code letters has been aimed at. The Code is simple to use, and the directions given are clear and concise, while the scope should prove sufficient to meet all requirements. An Auxiliary Code (the EE) covering a much wider range of public health activities is in course of preparation.

GOUZIEN (P.). **Faits épidémiologiques en Afrique occidentale française et accords sanitaires particuliers.**—*Ann. de Med. et de Pharm. Colon.* 1925. Jan.-Feb.-Mar.-Apr. Vol. 23. No. 1. pp. 66-81.

The author gives some account of the agreements which have been concluded, both national and international, to restrict the introduction of transmissible diseases, and in allusion to the crossing of the Sahara by French motor cars expresses the fear that typhus may be imported by this new channel from North Africa into French West Africa. He gives an outline of four outbreaks of disease demonstrating the necessity of sanitary accords between the African colonies which border the Atlantic Ocean—plague in Senegal, cerebrospinal meningitis in the Niger colony, advance of relapsing fever in that colony and the reappearance of yellow fever in Dahomey—all in 1924.

Plague appeared in Senegal in 1914, where it has been endemic since with annual recurrences; in the first months of 1924 there were notified 1,727 cases with 1,115 deaths (Cayor, Thiès, and Sine-Saloum.) In 1921, louse-transmitted relapsing fever, which has probably long existed unrecognized in French West Africa, broke into an epidemic and occasioned 50,000-60,000 deaths, chiefly in the French Soudan and Upper Volta, and later in the Niger colony. Here, as in other countries where it is endemic, the disease makes its annual reappearance in the cold weather. Yellow fever reappeared in April at Bohicon, near Abomey, and was fatal to six Europeans. Cerebrospinal meningitis reappeared, also at the first cold weather, in the south-west of the Niger colony and caused 6,597 deaths.



These four seasonal outbreaks are then considered with a view to the lessons they teach. The freedom from plague hitherto of the French Soudan is attributed to the meteorological barrier interposed by the high temperatures reached, *e.g.*, at Kayes 43° and 44° in April and May. The excess of humidity of the soil in winter is also against the flea. In the case of relapsing fever its extension depends on whether conditions are favourable or not to the louse, *e.g.*, clothing and water supply (for washing), and it is noted that the limit of the epidemic (apart from an extension to the Gold Coast) corresponded with a sinuous line dividing clothes-wearing Mahomedans in regions ill provided with water from tribes with little or no clothing and abundant water. Just as there is for plague a meteorological barrier, so there is for relapsing fever a human barrier.

For yellow fever the Gold Coast is regarded as a focus of permanent endemicity, and the colonies of the Soudan, Ivory Coast, Dahomey and French Togo as so in lesser degree; for these the term intermittent endemicity is used.

A. G. B.

## REVIEW.

LEAGUE OF NATIONS. **Health Organisation. Further Report on Tuberculosis and Sleeping-Sickness in Equatorial Africa. Submitted to the Health Committee at its Fourth Session, April, 1925.** [BALFOUR (Andrew), VAN CAMPENHOUT (E.), MARTIN (Gustave) & BAGSHAWE (A. G.).]—84 pp. With 7 maps.

The "Interim" report, of which this is a successor, was reviewed in Vol. 21 of this *Bulletin* (pp. 498-501).

**TUBERCULOSIS:** (a) *British Territories.* The present report is compiled from the latest Annual Medical and Sanitary Reports of the several colonies, where the respective numbers of cases of tuberculosis treated in 1922 were as follows: Gambia, 9; Sierra Leone, 91; Gold Coast, 385; Nigeria, 287; Nyasaland, 40; Tanganyika, 206; Zanzibar, 79; Kenya, 310; Uganda, 29; British Somaliland, 167 (and 215 in 1923). In Freetown (Sierra Leone) the pulmonary form is increasingly prevalent. In Accra (Gold Coast) a promising experiment in open air treatment has been carried on. From Northern Rhodesia there is little information, but the degree of infection is believed to be low. In the mines of Southern Rhodesia there were, in 1921, among 37,605 natives from various parts, 130 cases of phthisis, with 39 deaths. In Mombasa (Kenya) a ward for phthisis cases has been erected at the Infectious Diseases Hospital. In the Anglo-Egyptian Soudan "a certain amount of tuberculosis, both pulmonary and surgical, does exist, but the incidence cannot be said to be heavy"; the admissions for eight years (1916-1923) show, among fluctuations, a slight increase in later years, and for 1923 a percentage of 1.38 of the total admissions for all diseases.

(b) *French Territories.* To the information already given (*Bulletin*, Vol. 21, p. 499) it may be added that Dakar, where crowding is extreme, is named as an important focus; that the disease is rare in Togo and in the Equatorial Provinces; and that in French Somaliland it is widespread, attacking lungs and glands and bones equally, although the indigenes are shepherds sleeping in tents and passing the whole day in the open air, since "custom decrees that they receive in their hands the sputa of sick relative or friend."

(c) *Italian Territories*. Infection is present, but not common. The scrofulous type is the commonest, but the pulmonary form is rare, and the glandular form very rare.

There is nothing of importance to add to the information already given (*loc. cit.*) from the Belgian and the Portuguese territories. In Abyssinia, according to Dyce Sharp, "tuberculosis is as widespread as in other parts of tropical Africa."

**SLEEPING SICKNESS:** (a) *British Territories*. Here again this Report is compiled mainly from annual medical returns already noticed. Of human trypanosomiasis 15 cases were treated in 1922 in Nigeria; 8 were reported in Nyasaland, where, however, infected natives tend to hide away; 683 fatal cases were recorded in Tanganyika Territory—the Mwanza epidemic; 23 cases were detected in Kenya; and 263 (62 deaths) in Uganda. In the Anglo-Egyptian Sudan Tembura continues to supply the majority of the cases, and to stay the importation of infection all the districts that border on Uganda, the Belgian Congo, and French Equatorial Africa have been declared closed.

(b) *French Territories*. Statistics of numbers of natives examined and treated are given. The chief prophylactic measure practised is treatment of patients, and this implies periodical, methodical, and very searching rather than rapid surveys of the population. The fallacies of diagnosis by palpation of glands is emphasized. The local doctors should do the work; imported experts are not necessary. In this systematic treatment various derivatives of phenyl-arsenic acid have been tried, especially No. 189 and No. 190 (stovarsol), also "Bayer 205" and tryparsamide, both of them giving encouraging results; but, so far, nothing has shown itself so much superior to atoxyl as to justify its popularization. Atoxyl therefore remains the basis of the standard treatment, which, for early infections, consists of 6 massive injections per annum, at intervals of 10 days, of doses of 1.5 to 2.0 cgm. per kilogram.

(c) *Belgian Congo*. The report is very short and deals mainly with the training of native hospital assistants as searchers. Diagnosis is by palpation of glands.

(d) *Portuguese Territories*. The tone of the report here is rather perfunctory, except in the case of the island of Principe. In Angola the infection is *Trypanosoma gambiense* and the carrier *Glossina palpalis*; *G. fusca*, *pallidipes*, *longipalpis*, and *brevipalpis* are very rare; there are a few tracts where fly abounds, but the disease is there unknown; among possible reservoirs of the disease the pacaca cattle (*Bos brachycerus*) are mentioned. The prophylactic measures employed are treatment in concentration camps, and in certain places clearing. In Mozambique *T. rhodiense* is the infection and *G. morsitans* the carrier; but cases are few. *G. fusca* and *pallida* are rare. Closure and sanitary surveillance of roads from Rhodesia and Nyasaland is the chief precautionary measure.

DA COSTA's story of the clearing of the island of Principe from *Glossina palpalis* and the concurrent extinction of sleeping sickness is summarized. The island, which lies about 120 miles off the west coast of Africa in lat. 1° 4' N., has an area of about 48 sq. m.; much of its surface where uncultivated was covered with tropical jungle intersected with streams and swamps. Tsetse fly and sleeping-sickness are supposed to have been introduced with cattle and slaves from the mainland, about 1825. In 1902 the population was over 4,000; in 1907 owing to the ravages of sleeping sickness, it had fallen to 3,000, notwithstanding the continued importation of labourers. A methodical campaign of clearing, drainage, extermination of pigs and dogs that had run wild and thinning of the local fauna of civets and monkeys, and of catching the tsetse-flies by means of perambulating negroes wearing a back-piece of dark-coloured bird-limed cloth, resulted, in the course of a few years, in the extinction of the fly. In 3 years, 1911-13, nearly 470,000 flies were caught. At the same time the blood of the entire population was examined every 3 months, and every infected individual was isolated and treated with atoxyl.

(e) *Spanish Territories in the Gulf of Guinea.* Sleeping sickness is endemic in the island of Fernando Po, and on the mainland there are scattered foci in the numerous river-basins. In Fernando Po HUERTA saw, at the S. Isabel Hospital, 150 cases in 1920, and 36 cases in one month in 1923. Modern methods of treatment are current, but as regards prevention, "Any form of prophylaxis is difficult to apply, owing to the ignorance and obstinacy of the people."

As regards other parts of Africa, there are some who think that sleeping sickness may exist in the lowlands of Abyssinia, but know nothing for certain.

One of the appendices to the Report gives Dr. VAN CAMPENHOUT's objections to the appointment of a special Sleeping-Sickness Commission. He thinks—and there are many who will agree with him—that local laboratories established in the infected areas are aptest both for studying the disease and devising measures of protection. Visiting workers from other Governments might be attached to these laboratories for a definite term, and the laboratories might receive grants from a fund collected by the League of Nations. The other appendix contains an extract from the minutes of the third session of the Health Committee of the League of Nations, which includes the Committee's recommendations to the Council of the League on the subject of sleeping sickness. These recommendations include the appointment of a special mission to investigate certain fundamental questions of a biological nature.

A. Alcock.

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